Gas Journal

VOL. 287. 108th YEAR. LONDON, AUGUST 8, 1956. Nº 4856. PRICE 1/6

For Mechanical Handling Plant

Latest design of ROTASIDE TIPPLER for wagons up to 35 tons gross.

Note :—
Sturdy construction and clean lines.
Gear Drive throughout—No ropes employed.
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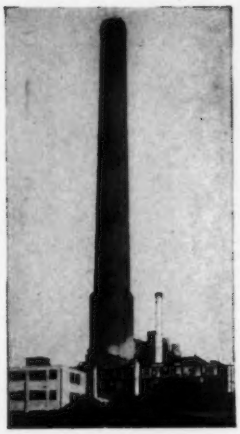
From the investigation of the site to the completion of the job, the Cementation Co. Ltd. provide a complete world-wide service on foundations and underpinning, which is unrivalled for experience, facilities and resources.

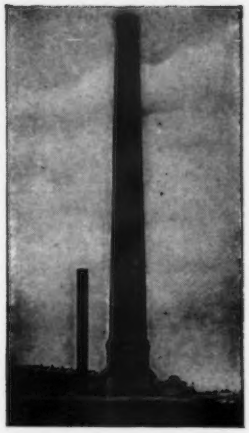
Time has proved, over and over again that concrete piles and cementation methods not only give the greatest strength and stability to many types of foundation, but are often the only solution in certain difficult conditions.

In addition there is no harmful vibration, distortion or excessive noise during construction.

The successful completion of over 4 million feet of Bored Piling during the last fifteen years is an achievement which speaks for itself.

Left : Trial borings for reconstruction of Coventry Cathedral.





Two of the largest chimneys in the British Isles; on foundations of Francois Concrete Piles (left) and Francois Cementation Piles (Right)

Write for your copy of our new booklet about Bored Piling.

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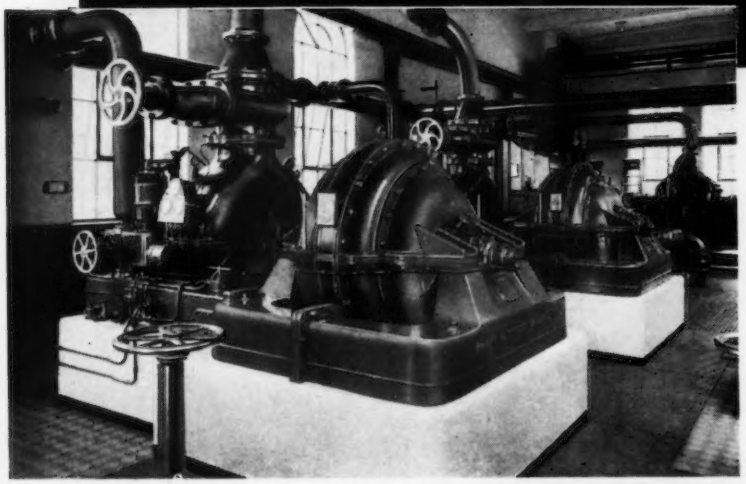
for medium volumes and higher pressures



Photograph by courtesy of South Eastern Gas Board

- LARGER CAPACITIES IN SMALLER SPACES
- HIGHER EFFICIENCIES
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'CM' 62 Two Stage Turbo Boosters each to pass 500,000 cubic feet per hour at 5 lbs per square inch (Gas—specific gravity = .55) Driven by 260 b.h.p. Brotherhood Turbines running at 7,000 r.p.m.

Installed at Waddon Works, Croydon, for the supply of gas to:— Redhill, Horley, and Crawley New Town.

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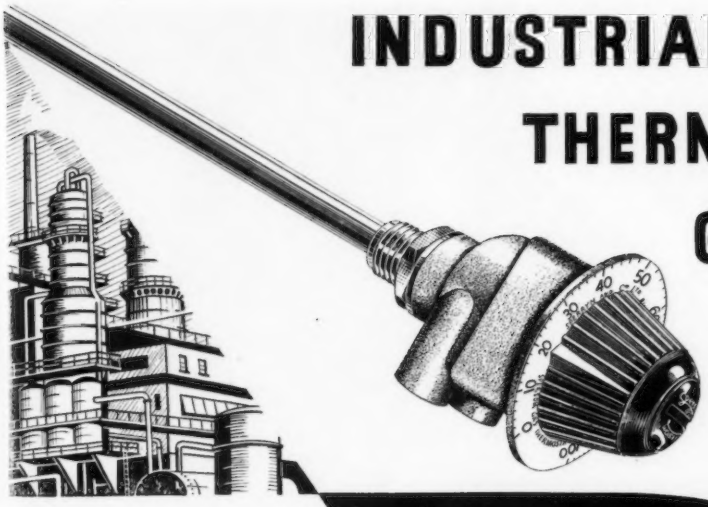
INDUSTRIAL THERMOSTATIC GAS CONTROLS



Thermostats in this range include direct and indirect acting types for low, medium and high temperatures. Special models for bakers' ovens and fish frying ranges are also available. For complete details ask for Pamphlet No. R.G.7.

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when atmospheric pollution is severe

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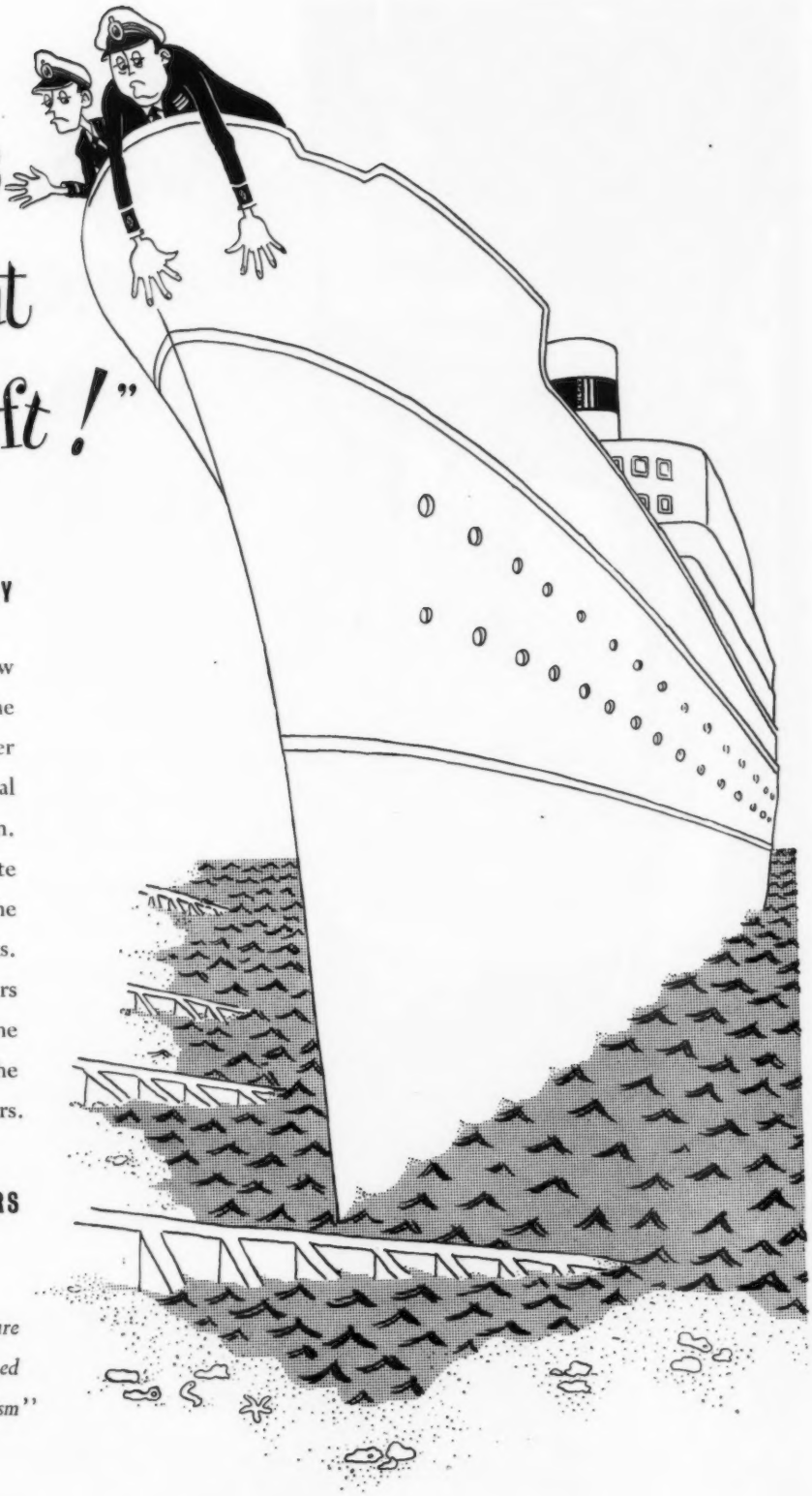
TAS/AS 163

"The compass was right when we left!"



MAINTAINED ACCURACY

The measurement of a gas flow is an exact science, and the maintained accuracy of the meter depends upon the mechanical excellence of its construction. Revenue losses from inaccurate metering rise directly with the rising cost of coal to the gas works. So it is that dependable meters and a reliable repair service become increasingly important to the Area Gas Board and its customers.

BY ROBINSON'S METERS

All pre-payment meters are fitted with the World-renowned "Smith's Mechanism"

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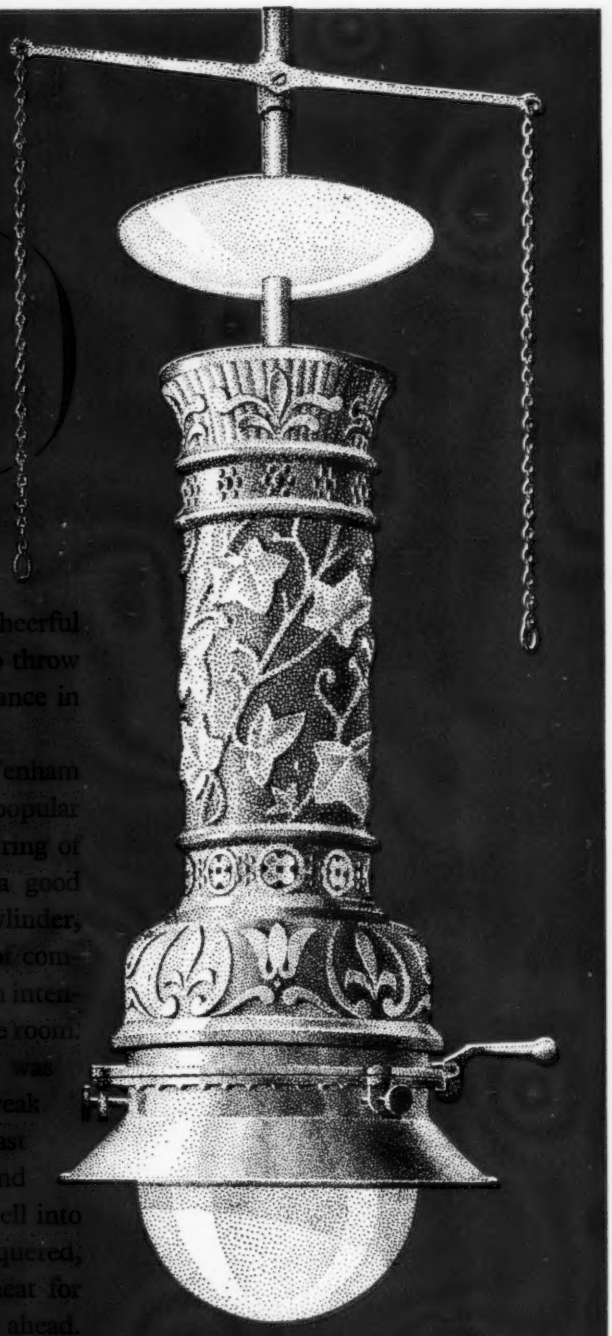
THE PROGRESS OF GAS

1890



The Welsbach gas mantle gave off a fine, cheerful light. About 1903, by inverting the mantle to throw the light downwards, another important advance in gas lighting efficiency was achieved.

Meanwhile, in the 'Nineties' this Wenham Recuperative Inverted Gas Lamp was very popular in shops, offices and factories. A horizontal ring of flame at the bottom, shining down, gave a good working light. Inside the decorated cylinder, passages led back some of the hot products of combustion to heat the incoming gas and air, which intensified the flame and also helped to ventilate the room.

By early Edwardian times, gas lighting was almost universal. Electric light, at first as weak and unsure as the earliest gas burners, was fast becoming a keen competitor. Lower costs and greater efficiency kept gas in the lead until well into the new century. Then, as electric light conquered, gas was increasingly developed to provide heat for homes and factories. A bright future still lay ahead.

Issued by Imperial Chemical Industries Limited for the interest of the gas industry — an important user of

I.C.I. copper tubes, capillary and compression fittings

including : 'KUTERLON' underground copper tubes
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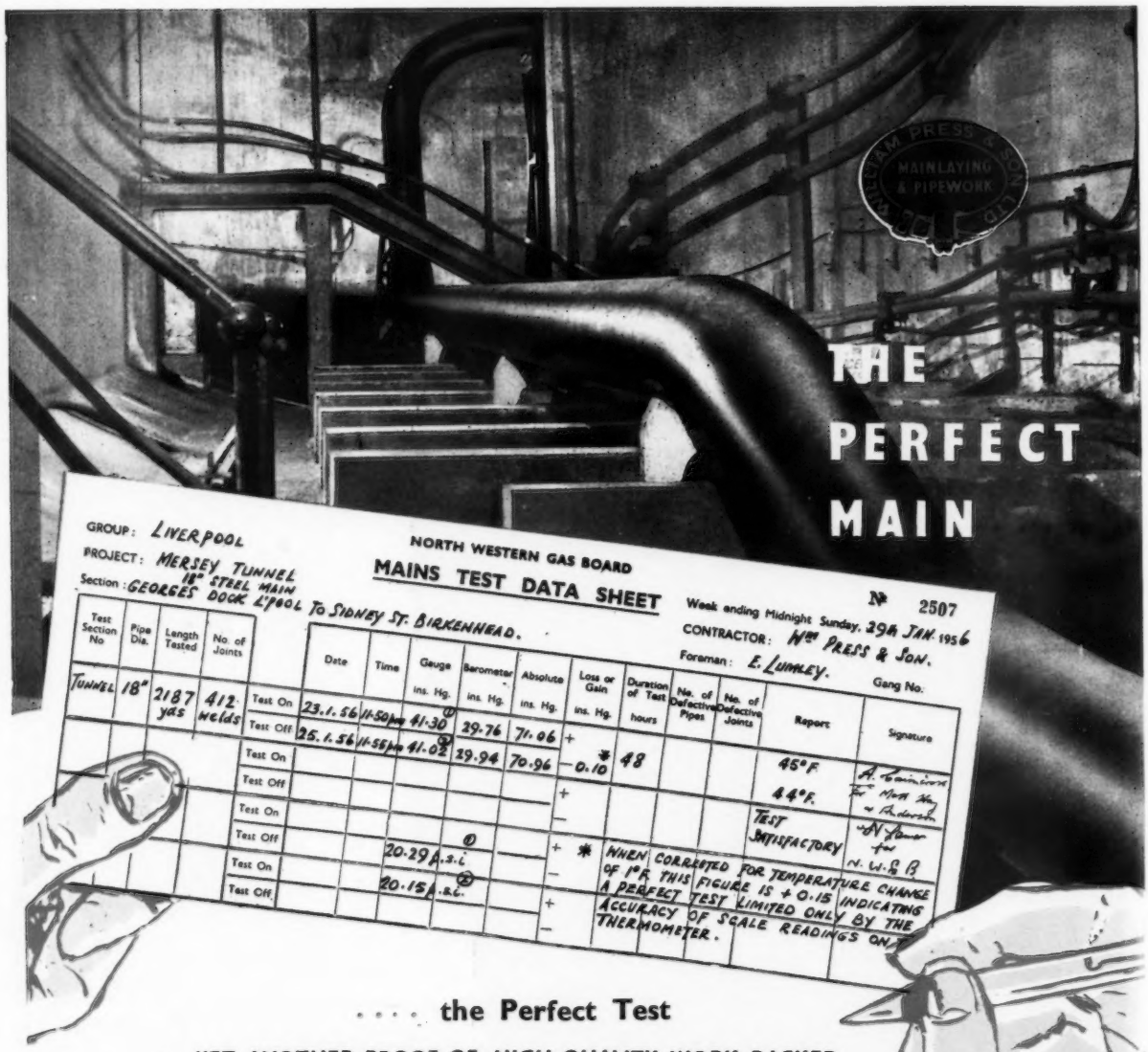

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YET ANOTHER PROOF OF HIGH QUALITY WORK BACKED BY 43 YEARS' EXPERIENCE

As many millions of people use the Mersey Tunnel yearly, the installation of the 18" Gas Main called for workmanship and organisation of the highest order. Every welded joint was subjected to radiographic inspection to ensure that the ⅜" thick Steel Main was equal in strength throughout its total length of 6,600 ft. In addition, we were responsible for laying the 4,000 yds. of 18" Cast Iron Approach Mains in the densely built-up areas of Liverpool and Birkenhead, which is just another example of our organisation's versatility.

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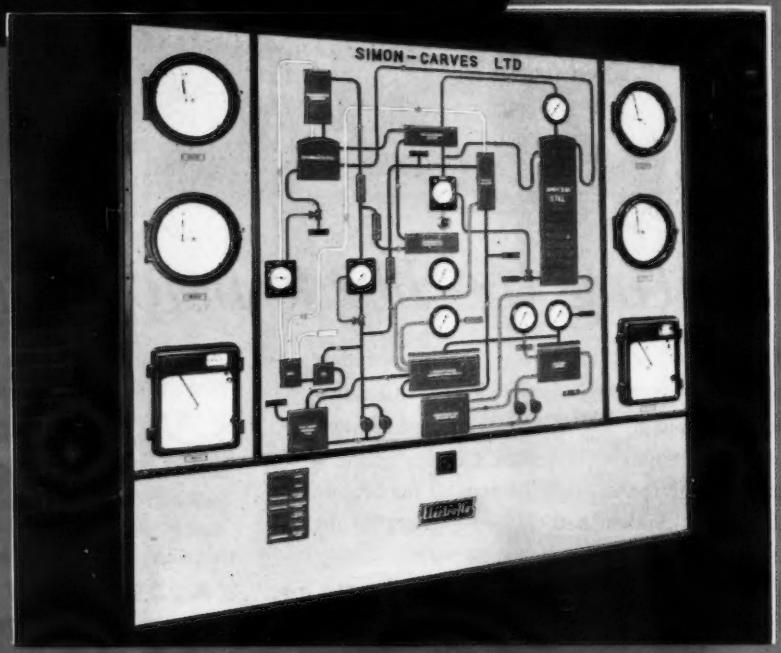

Complete Automatic Control and instrumentation of the new effluent treatment plant

at

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This Changing World

Putting the horse before the wagon

The gas industry has always been dependent on frequent supplies of coal in large quantities, and the rapid growth of steam-powered railways in the first half of the 19th Century made it possible for the industry to expand far beyond the limits which had hitherto been set by horse-drawn and water-borne transport.

As early as 1855 the Phœnix Iron Works, at Stroud in Gloucestershire, was producing gas plant and machinery. But so important are railway facilities to the gas industry, that today — alongside the plant and machinery — will be found specialised equipment designed to make the handling of bulk materials by rail much easier and far less costly.

Hydraulically operated End-type Waggon Tipper, one of two such Tippers, each capable of handling a 24½ ton capacity truck, installed at the New Works Extension, Stoke-on-Trent.

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Phœnix Iron Works, Stroud, Glos.
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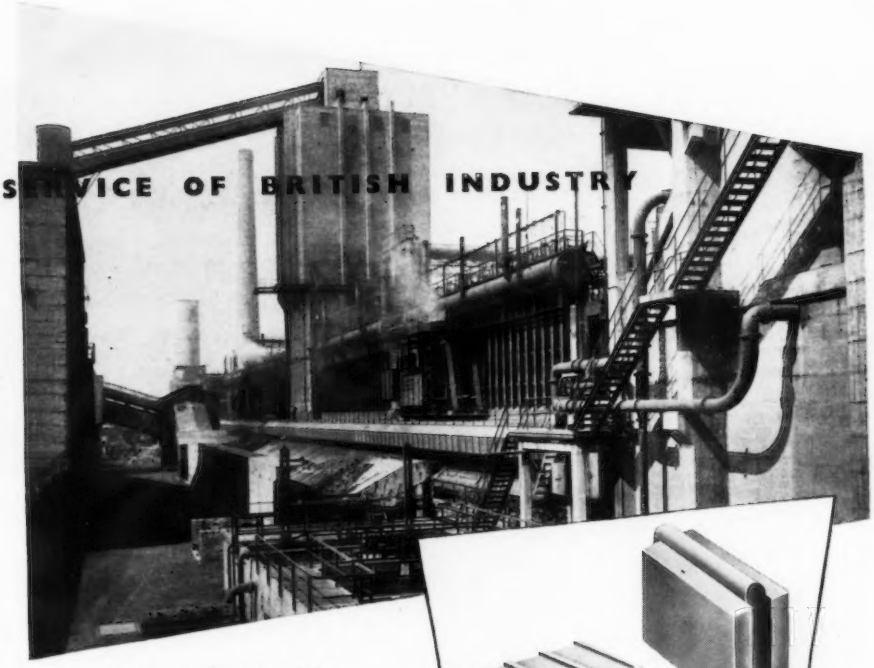

South Eastern Gas Board, East Greenwich.
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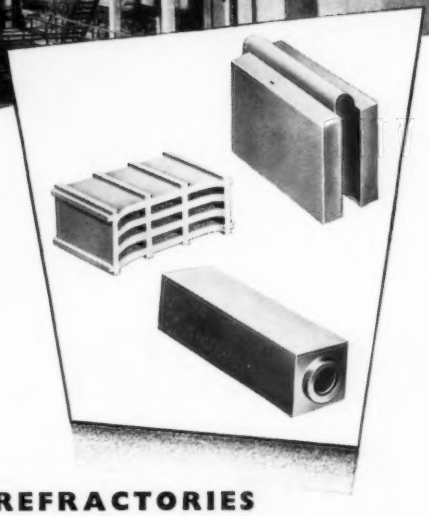

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'BEST WORTLEY' is the hall-mark in refractory material. 'BEST WORTLEY' Refractories are playing an ever-increasing part in Britain's industrial development. Especially is this so in the gas making and coking industry where 'BEST WORTLEY' enjoys a fine record and reputation for service. Leeds Fireclay Technical Department is available always for advice on individual problems and selection of materials.

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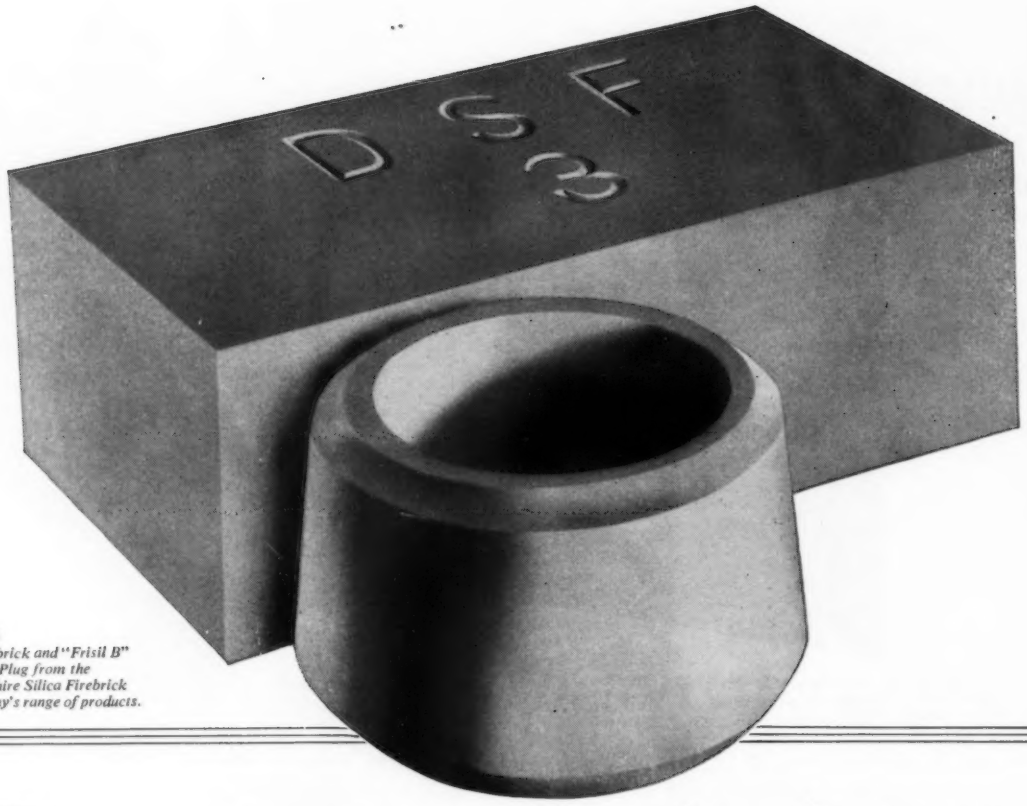

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Square brick and "Frisil B" Nostril Plug from the Derbyshire Silica Firebrick Company's range of products.

The greater the insistence on furnace efficiency, the greater the need for

DERBYSHIRE SILICA REFRACTORIES

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on gouging, grooving, cutting

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Padding of clutch casting removed with Arcair Torch. Note clean surface. Vertical and horizontal cuts in one operation.

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- *Many times faster than chipping*
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- *Cuts clean—no further preparation necessary for welding*
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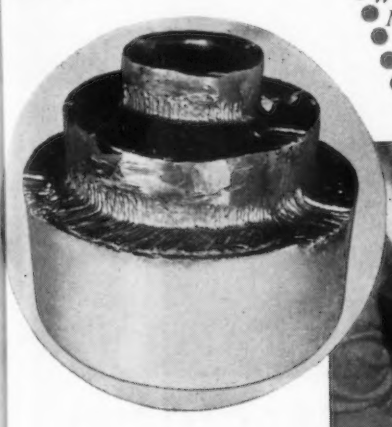

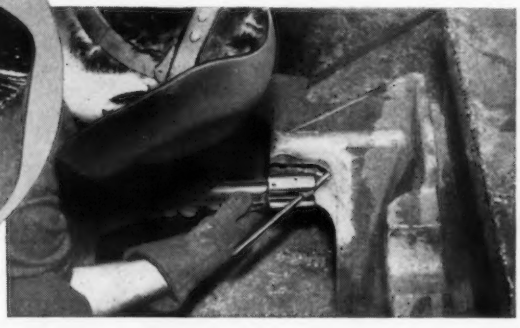

Cutting alloy casting with Arcair Torch. Tool functions in all positions. Self-aligning jets rotate with electrode to any angle.

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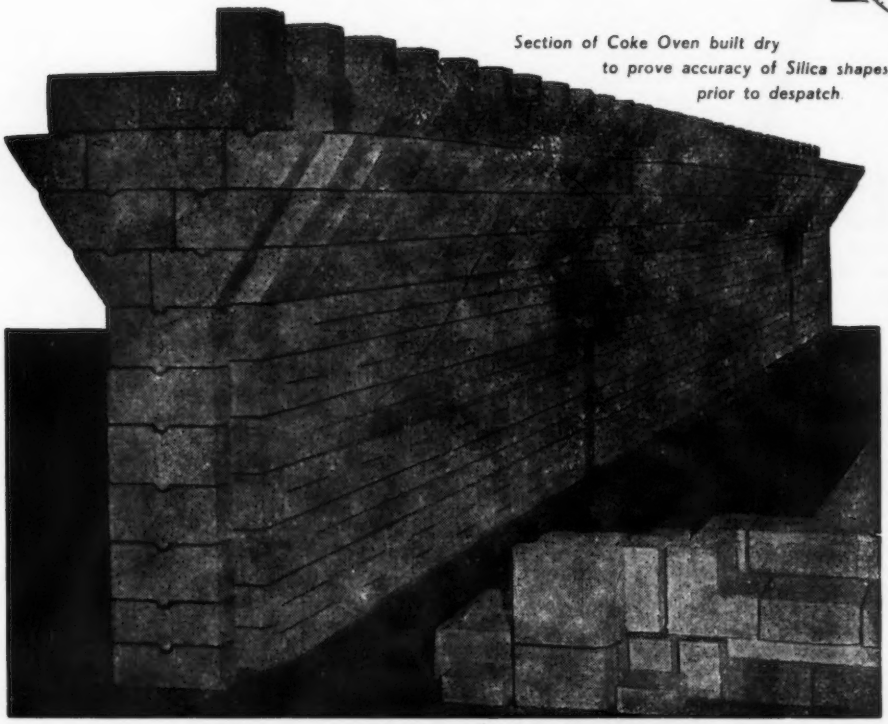

Section of Coke Oven built dry to prove accuracy of Silica shapes prior to despatch

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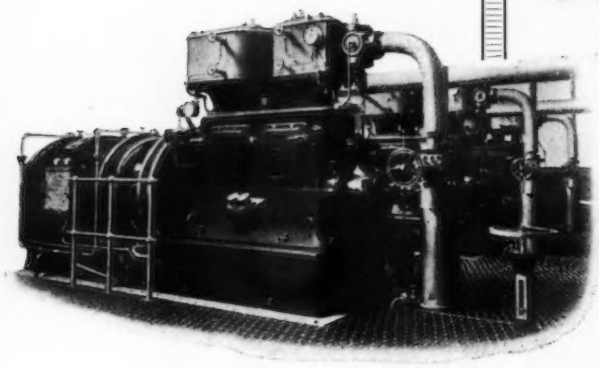

Three 360 B.H.P. Parker Engines driving Waller Crankless Compressors at a Gas Works.

Built in all sizes from 10 to 1,000 B.H.P. for driving exhausters, compressors, boosters, electric generators, fans, benzol pumps, etc.

Running on steam from waste heat or breeze-fired boilers, Ashworth & Parker Engines will supply all the power needed to keep your plant in full production.

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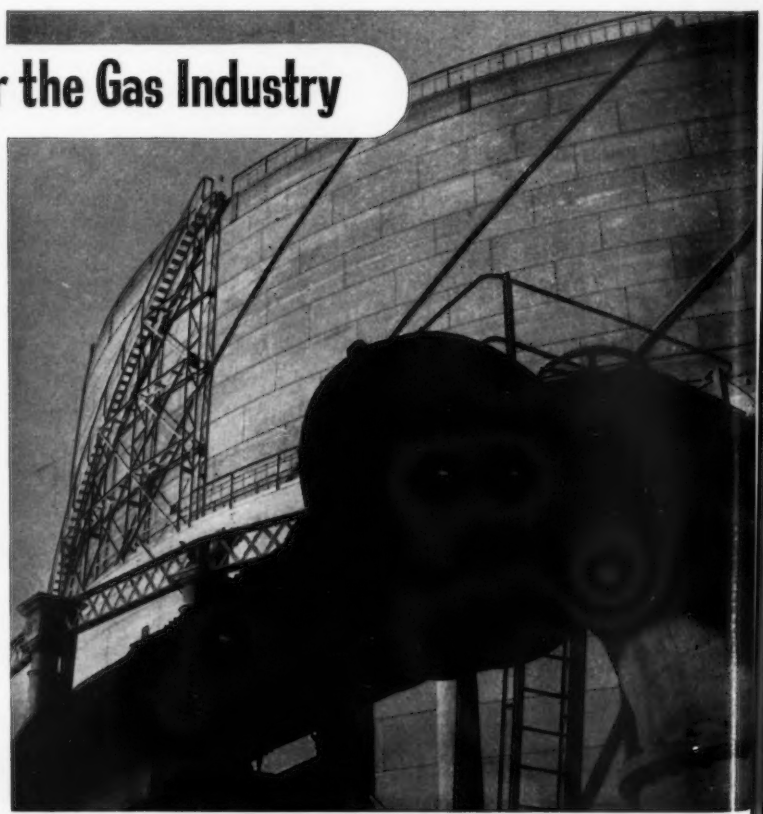
Aluminium Paints for the Gas Industry



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Represents the latest and greatest advances in the protection of iron and steel subject to very high temperatures. "LUMEROS X" gives adequate protection at temperatures up to 600°C. Good water resistance. No undercoat required. Available in Aluminium or Black.

"METTAL" Aluminium Paint.
A general purpose paint of the highest quality and durability and possessing great brilliance. For indoor and outdoor use. Whilst not specifically designed as a heat resisting coating "METTAL" will stand temperatures around 212°F (100°C).

"METTAL" (Thermal).
Specifically designed for indoor and outdoor use on metal surfaces up to 350° F (177°C).

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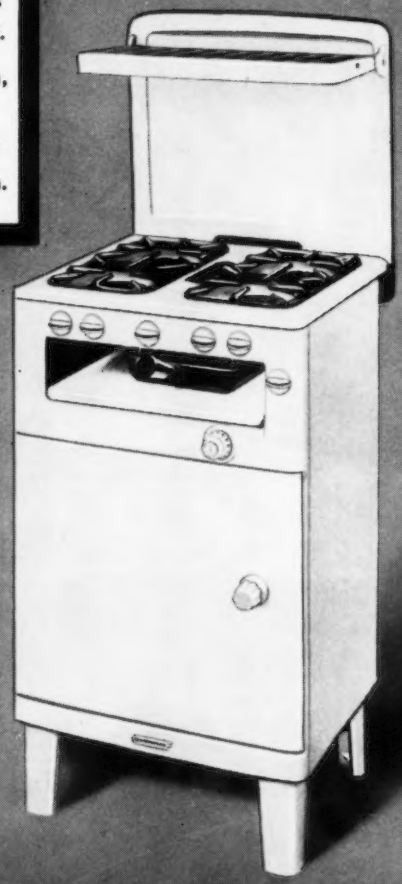
*Supreme Cooking!

Two distinguished "Newhome" products Model Nos 286 & X2.

Their presentation, reliability and efficiency guarantee complete satisfaction.



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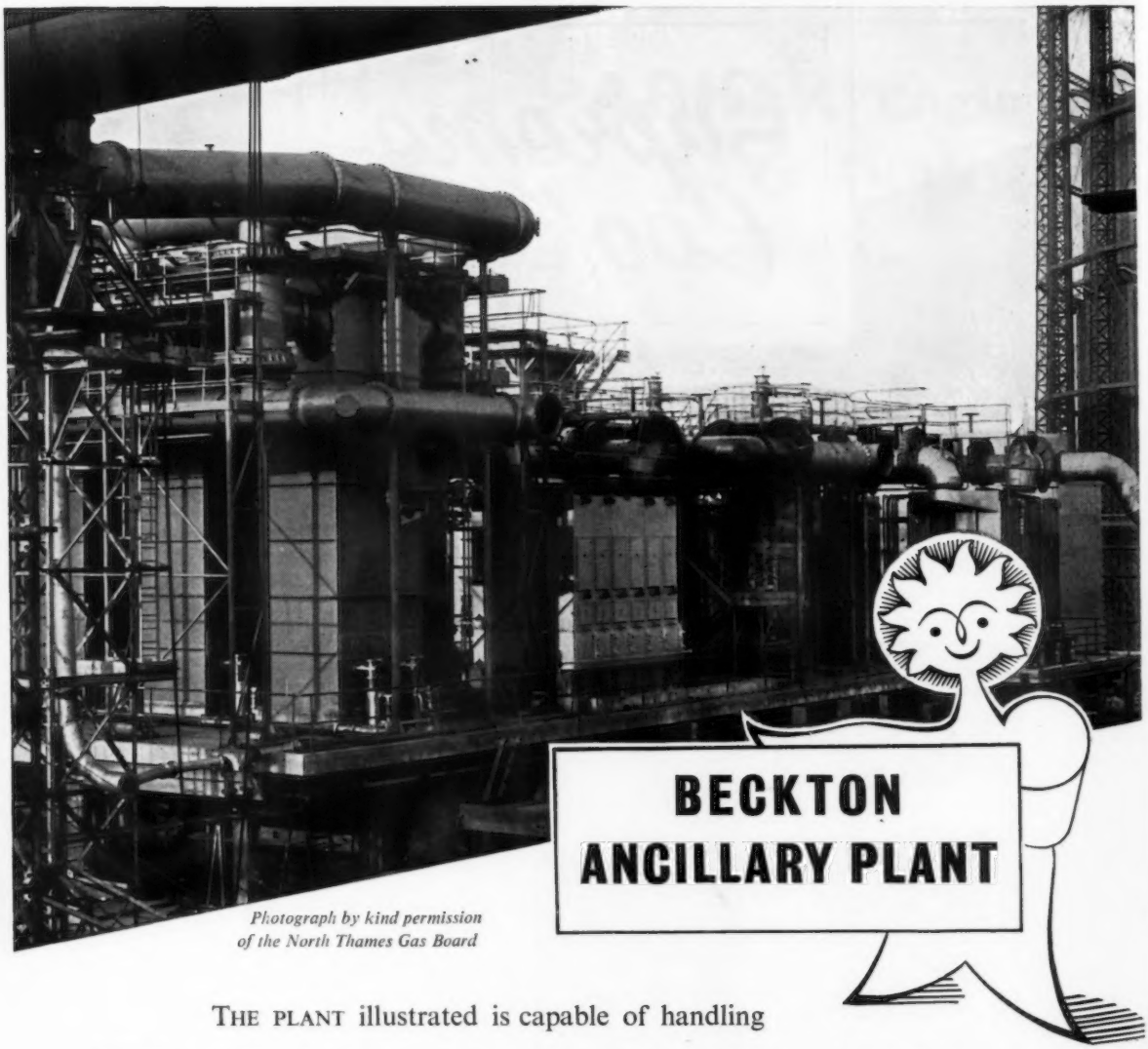

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BECKTON ANCILLARY PLANT

THE PLANT illustrated is capable of handling 8 million cu. ft. of coke oven gas per day, and provides primary cooling, electrostatic tar removal, naphthalene extraction, secondary cooling, and ammonia washing. The installation is complete with liquor and tar storage tanks, liquor treating plant and all the necessary circulating pumps.

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FLUE PIPES & FITTINGS
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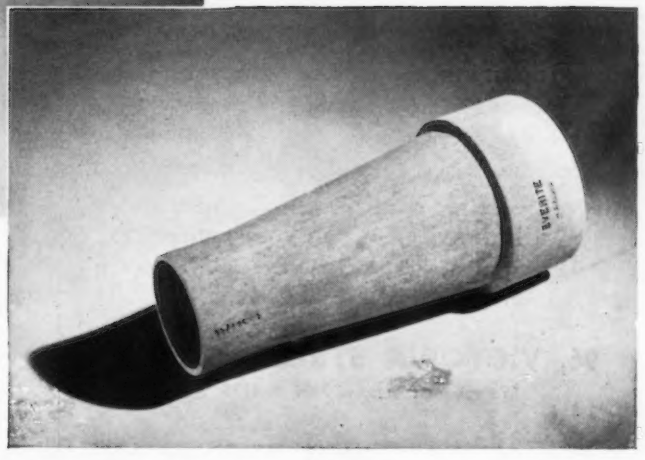

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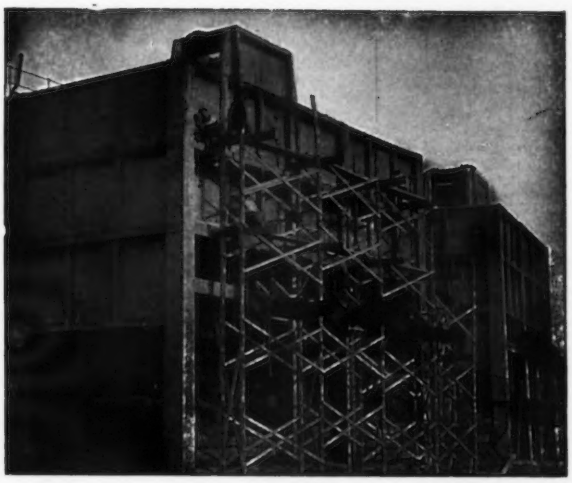

One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

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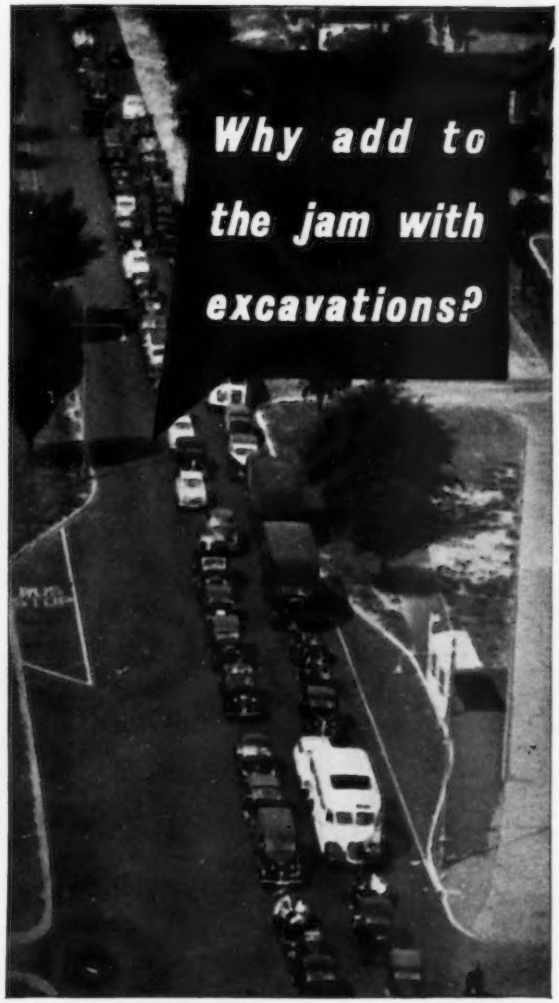
Handbook "GUNITE" sent on request



As the volume of traffic increases year by year, excavations on the roads become steadily more costly and inconvenient. They can be minimised by using the Pass Hydraulic Thrust Boring Machine for Underground pipe and cable installations. The machine offers a choice of four speeds and can be hand or power operated. Write for illustrated and detailed leaflet.

PASS
GAS AND WATER ENGINEERS

HYDRAULIC THRUST BORING MACHINE

Visit our stand at the "Public Works & Municipal Services Exhibition" Olympia, Nov. 12—17.

Specialists IN UNDERPRESSURE ENGINEERING
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WHESSOE

Condenser and W.W-D. Electro-Detarrers now working at KENSAL GREEN

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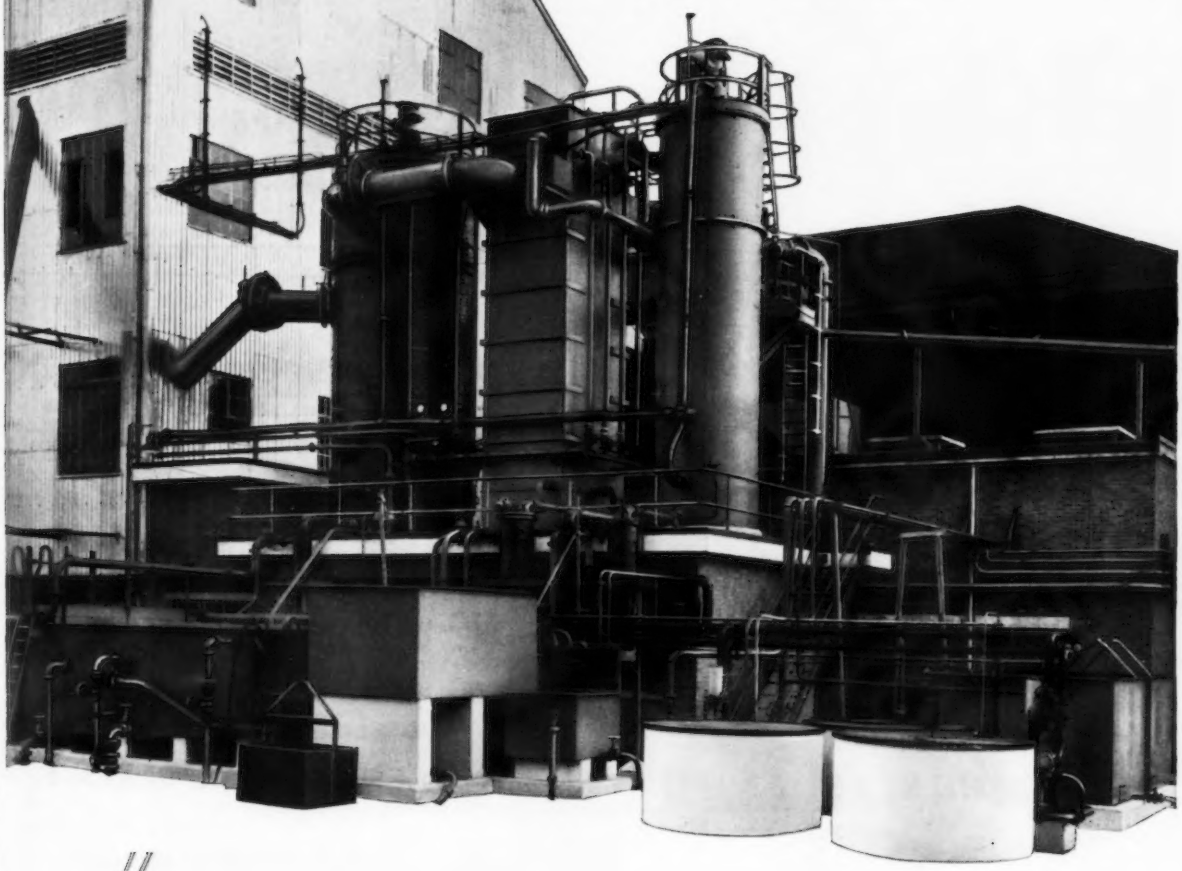

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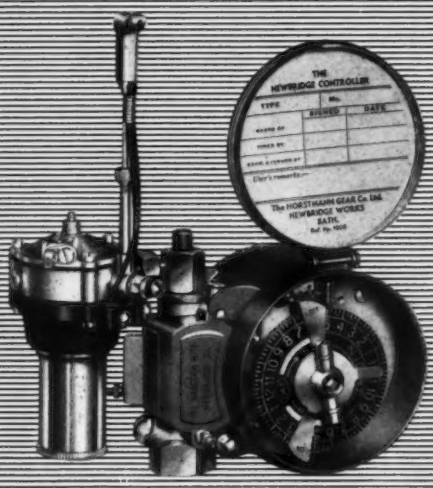

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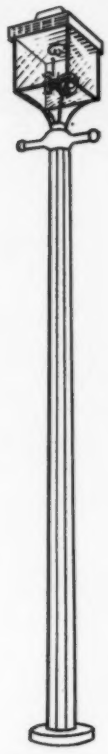

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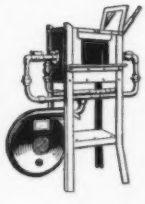

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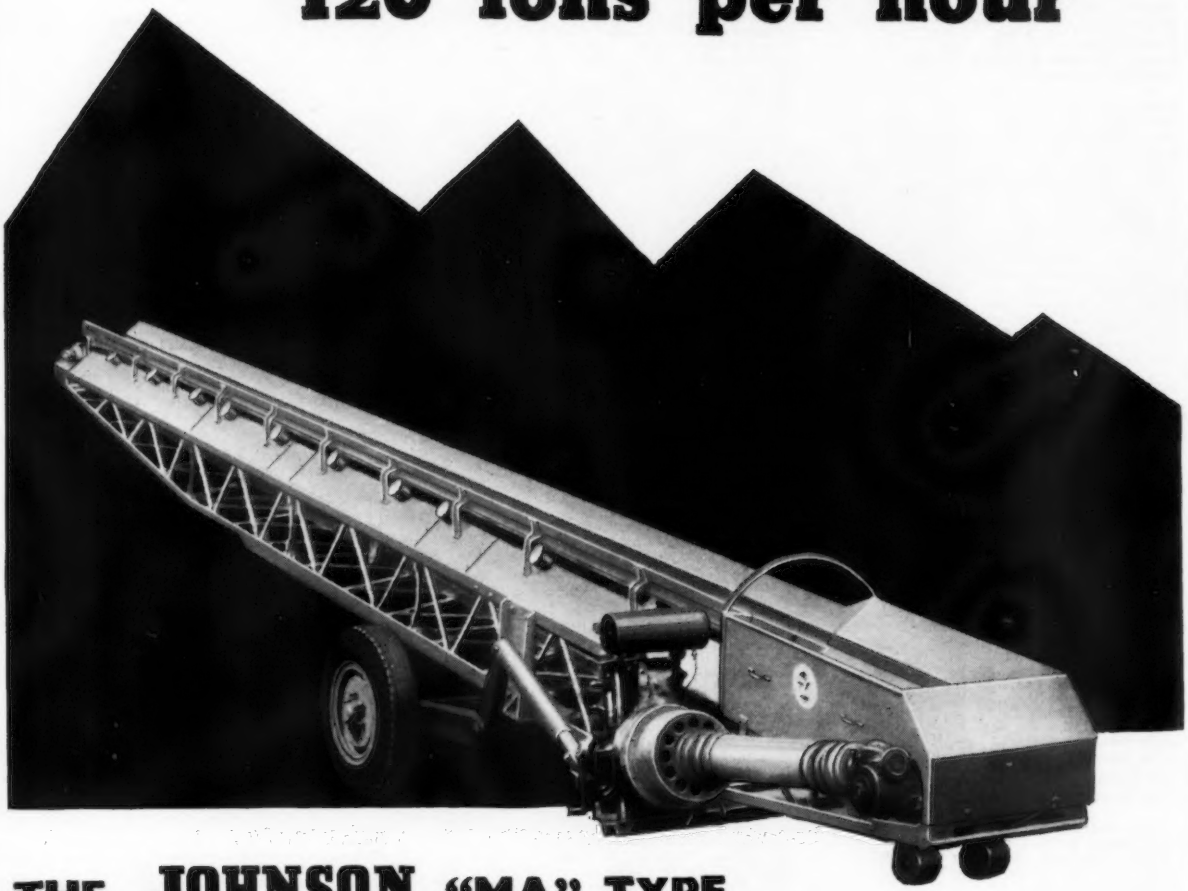

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Gas Journal

VOL. 287 NO. 4856 August 8, 1956

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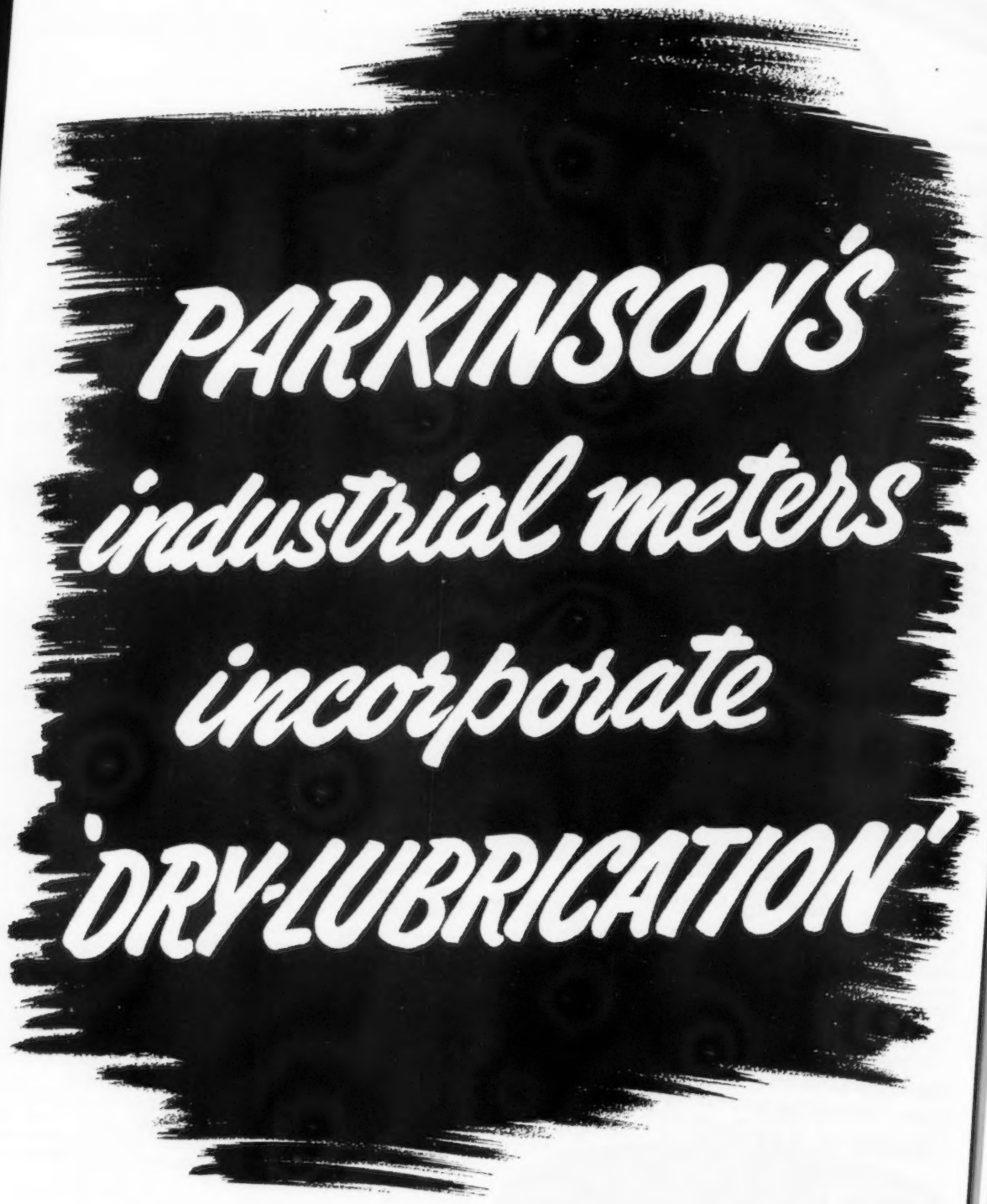
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Gas Journal

VOLUME 287. No. 4856. AUGUST 8, 1956. 108th YEAR

The Continuous Vertical Retort

THROUGHOUT the nineteenth century town gas was manufactured almost entirely in horizontal retorts requiring power, whether manual or mechanical, for charging and discharging, while the charge remained static during the carbonising period. The first attempt at applying gravity to these operations took the form of the inclined retort but in the twentieth century the vertical retort appeared, first with the static charge in Germany and very soon after with continuous charging and discharging in Great Britain.

At the Fifth World Power Conference in Vienna, Dr. Burns described the development of the continuous vertical retort to an international audience in a paper which is a model of concise statement infused with a consciousness of the world point of view. ' It is interesting,' he says, ' when considering carbonising practice throughout the world to note how the continuous vertical retort has remained so peculiarly British . . . This may very well arise from the fact that the continuous vertical was primarily a British development but, nevertheless, the test of time has shown that this type of plant successfully meets some of the unique requirements of the carbonising industry in our country.'

Dr. Burns sketches briefly the early difficulties by the pioneers in the new system, with particular reference to those encountered by Woodall-Duckham commencing with their Bournemouth installation of 1903. Some earlier attempts, such as those of Settle and Padfield, came to nothing. But by 1906 the Woodall-Duckham retort began to make definite progress and by 1908 the Glover-West system, based on experience in the continuous heat treatment of shale in the Scottish shale oil industry, took practical shape in the installation at St. Helens. From these dates ' the progress of the continuous vertical retort was rapid.'

The two systems, while fundamentally similar, differ in two main points of detail, the shape and size of the retort and the method of heating. Dr. Burns treats both these features in some detail. After their very early installations, Woodall-Duckham adopted the rectangular retort with major axis developing up to 103 in. The Glover-West oval retort has remained definitely smaller with a maximum of 50 in. on the major axis. It is interesting, however, to note that somewhat smaller sizes have been adopted in the two latest installations built in the North Thames area, one of each system. At Kensal Green, ' the retort section ' (of the rectangular type) ' which is considered to give the best results for all types of coal—has a major axis of 76 in. at the top tapering to 82 in. at 15 ft. down the retort.' In the selection of the retort for the installation at Bromley, ' Experience in the North Thames Area indicated that an oval retort with 40-in. major axis was likely to give the best results.'

In considering these very important and weighty decisions, based on experience gained over 30-40 years in the Gas Light and Coke Company and the North Thames Gas Board, the situation of coal supplies in the London area must be borne in mind. These are drawn largely from the Durham coalfields and for the rest from those of Yorkshire. In other words the coals lie in the upper ranges of swelling index. In regions where the coals are of lower swelling index the maximum sizes of retorts of both types operate without any difficulty.

Following brief descriptions of these two important installations (full descriptions of which have been published in our columns) Dr. Burns sets out in a most interesting and digestible form the outstanding features of the continuous vertical and particularly the ' reasons why the continuous vertical retort has proved popular in carbonising practice in Great Britain.' We have reproduced this portion of the paper in full.

The continuous vertical has done more than anything to clean up the gasworks; it ' provides an amenity factor generally absent from static carbonising plant,' but when Dr. Burns concluded this section with the remark that ' the vertical retort installation will operate successfully in the open air with the provision only of an umbrella roof for operators,' he probably had in mind climates more equable than those of Great Britain.

On variations in methods of operating CVR's Dr. Burns shows the sensitivity of this type of plant to specific characteristics of the coal carbonised. His figures are of definite value. With regard to the calorific value of the gas made, indicating the wide flexibility of the CVR, it is to be noted that the reduction of throughput as the c.v. is reduced, when these figures are multiplied by therms per ton, indicate that the usually accepted statement that therms per retort remain substantially constant is justified by experience.

The very short passage on coke quality is in itself enough to justify the conclusion that if the demand for solid, smokeless fuel continues in Great Britain—and it seems likely to do so for some time to come—'it is likely to prove suitable and economic to manufacture it *near the bigger centres of population,*' for which purpose the CVR will 'prove suitable both from the amenity point of view and from the quality of its products.'

Ten Years of Gaz de France

GAZ de France, Service National, came into being in 1946. Articles written in celebration of its tenth anniversary appearing in the June issue of our contemporary, the *Journal des Usines à Gaz*, were abstracted in the 'GAS JOURNAL' on August 1, p. 285. They describe in some detail and under several headings the present organisation of the industry and its development during the first ten years of the new regime. Some broad differences will be noted at once between the gas industry in France and that in our own country.

The most striking of these is the far greater degree of centralisation of control and administration in France. At the very outset we note that there is only one Journal, and that the official organ of the Association Technique de l'Industrie du Gaz en France, the equivalent of our Institution of Gas Engineers. Also, it is to be seen that the whole industry in all its aspects is definitely controlled by a Conseil d'Administration under its President, Monsieur Le Guellec, with a Director General, Monsieur Combet, and a Joint Director General, Monsieur de Chizelle. This august body and its able directors decide upon the national policy of the industry and through its officers at headquarters and in the regions carries that policy out, subject only to the over-riding control of the appropriate Ministry whose decrees are generally published in *le Journal Official* for all to read. These decrees often go into considerable detail particularly with regard to the prices which shall be charged for gas and services and the methods of negotiation between Gaz de France and the communes served by the industry.

But even more important is the evidence of the close and effective collaboration of all the basic fuel industries, coal, steel, electricity and gas in a national fuel policy. Particularly close is that between gas and electricity. We reported in March 1952, p. 262, a new convention setting up a financial agreement constituting the basis of relations between the two industries. It replaced the original convention of 1946. We said: 'That convention stipulated that the two industries should carry out, by each of their own services and as it concerned each of them, the activities confided to them by law; to this is now added, that certain services may be organised and exploited in common when that would result in an improvement in administration. In particular the two industries recognise the advantage of . . . the mixed distribution of electricity and gas functioning under the same control of administration.' In January, 1953, the composition of the Committee of Co-ordination of Gas and Electricity was defined as: A full-time President, the commercial chiefs of gas and of electricity, the chief of the Central Service of Mixed Distribution, representatives of the financial directors of the two industries. Other members could be co-opted.

For the sake of clarity, before going into detail about the French organisation one should look at the gas industry in France in comparison with our own. The complete picture is shown in the Statistical Review presented last year to the International Gas Union. The number of inhabitants in the area served by Gaz de France in 1953 was just over 42¾ mill. of whom some 21 mill. were in the area actually served, against 49 mill. in Great Britain. The volume of gas sold was nearly 3,000 cu. metres against 14,600 cu. m. in Great Britain. In France this gas was distributed in the ratios 67.2% to domestic consumers, 12.6% commercial, 18.4% industrial, compared with 55.3%, 14.1% and 26.5% respectively in Great Britain. In France some 2,600 mill. cu. m. was made at the gasworks against 14,000 in Great Britain while 571 mill. cu. m. of gas was purchased, mostly from coke ovens, to which should be added 58 mill. cu. m. of natural gas, mostly in the South West, and about 27 mill. cu. m. 'imported'; in Great Britain 2,000 mill. cu. m. of gas was purchased from coke ovens and other sources. Coal used in Great Britain was 27.4 mill. metric tons, against 4.87 mill. in France. Coke for the production of water-gas and oil for carburetting and for gasmaking were roughly in the same proportion. Also included in the statistics for raw materials used in the French gas industry were some 8,000 tonnes of liquid petroleum gases and 83.7 mill. cu. m. of natural gas.

The number of consumers in the French territory was about 5½ mill. against 12.44 mill. in Great Britain but the greater density of consumers is indicated by the figures 216 per square kilometre in Great Britain against 78 in France. Sales per consumer were 359 cu. m. against 1,173 in Great Britain while the figures for sale per head of population of the territories in question were 69 and 296 cu. m. respectively. Another interesting figure is that showing the rate of expansion, which is approximate; the 'index of sales (1938=100)' was 167 in France against 160 in Great Britain. Measured in volumes of gas sold, then, the magnitude of the industry in France is one-fifth of that in our own country; it is roughly 50% more than the capacity of the North Thames Gas Board.

The solid-fuel open fire is practically unknown in France. Coke is very largely used for space-heating but always in the closed stove. This fact, coupled with the immense importance of the steel industry, emphasises the predominance of coke in the national fuel industry. It is not surprising, therefore, that the coke oven has become the main feature of the larger gasworks. 'The carbonising industry tends to use the same form of plant,' *i.e.*, the coke oven, 'whether the principal product is to be gas or coke.' M. Delaruelle, indeed, points out that the national policy is directed to 'securing the maximum of autonomy in France' (with Lorraine and the Saar along her eastern border), 'in the production of metallurgical coke.' Gas in the industrial north-west, with Paris at its western end, is dominated by coke

ovens and by the fine new transmission line carrying 35½ mill. cu. ft. of gas per day at a pressure of 60 atmospheres, 625 miles of steel main stretching from Nancy to Paris. Technical efficiency is expressed in the raising, within the ten years, of saleable coke from 41.5 to 50% by weight of coal carbonised.

The national plan of 'cokefaction' has been drawn up in collaboration between the coal, steel and gas industries, and the atmosphere in which this plan is being developed is indicated by M. Delaruelle's claim that the gas industry will play a big part in the national 'energy-system'—'it will continue to be an essential element in the marketing of coke in France,' apparently mainly because it will continue to be the distributor of all the gases available from coke ovens whether operated by itself or by the other two industries as well as other gases—from oil refineries in the form of residual gases, or liquid products capable of gasification, or natural gas.

Research is concentrated in the new department under the direction of Bolzinger and Delsol, of whose extremely interesting article we gave a substantial extract. Much of the work they are doing is well-known and has been followed in this country with the very greatest interest. It follows, as the Directors gracefully acknowledged, in the traditions of Regnault and Sainte Claire-Deville and later of Ribaud, all names of world renown.

In the commercial (sales) field the progress of Gaz de France, as outlined by M. Georges Robert, the energetic and resourceful Commercial Director, has been most impressive. It is to be noted, by the way, that he comes down heavily in favour of the two-part tariff. Also of interest is the close collaboration between his department and the national federations of contractors, both on the constructional and the installations sides. The formidable problems which confronted Gaz de France in the field of financial administration, 'at its birth' and throughout these difficult times, are perhaps rather hinted at than fully described in the modest statement of M. Jacques Certeux, Director General of the financial and juridical affairs of Gaz de France. It is evident that his troubles are by no means at an end.

Mr. Nérot's account of the structure of education and training are of great interest. It may well contain useful hints in the development of our own educational schemes, particularly in the direction of the already going 'sandwich' schemes and refresher courses. The latter might well be extended to the technician as they are in France.

Gaz de France faces the next ten years in a confident spirit, yet alert to coming changes. As M. Combet puts it: 'The rhythm of the profound modification of the gas industry in France tends to a crisis. It is not easy to predict what form our industry will take in 1966.'

Brown Coal in Australia

IT is not only in Europe that there is a shortage of suitable quality coals for gas making. In parts of Australia 'brown' coal will have to take the place of 'black' coal and increasing quantities of oil will be gasified to take the place of straight coal gas, or 'black coal gas' as it is known 'down under.' In the past Melbourne has used black coal gas while Sydney has used a mixture of black coal gas and oil gas. Dwindling supplies of high quality black coal, however, are forcing both cities to revise the make-up of their gas. This year Melbourne will start using a mixture of brown coal gas and oil gas while Sydney will start using more and more oil gas and less and less black coal gas.

In 1945 a coal survey revealed that black coal fields were becoming depleted but that brown coal was available in almost unlimited quantities relatively close to the city of Melbourne. With this in mind an economical way to gasify brown coal was sought, and the Lurgi process decided upon. With the aid of two German experts, plans were made to establish a Lurgi plant at Morwell in the rich Latrobe valley, some 100 miles from Melbourne. When the plant opens this year it will have an initial production of 15 mill. cu. ft. of gas per day—more than one-third of the total metropolitan consumption. Within 30 years the plant should be supplying the requirements of the whole of Victoria.

Brown coal briquettes will be gasified in a mixture of steam and oxygen at 300 lb. per sq. in. and the gas will be produced in massive bottle-shaped generators at high pressure. Transmission will be by 80 miles of 18-in. pipe line to a control station some 20 miles outside Melbourne at Dandenong. From here it will be piped to suburban plants where it will be blended with other gases, including waste oil gases, to raise its heat content from 450 to 500 B.Th.U.

In Sydney, a new era in the production of gas from oil will begin later this year when the Petroleum and Chemical Corporation (Australia) Ltd., starts making a rich type of oil gas at Silverwater in the city's outer suburban area. This gas will have twice the calorific value of gas made from high grade coal and will be used for blending with gas made from lower grades of coal.

At present Sydney is using a mixture of 80% black coal gas (using coal brought by boat from the Maitland fields, further up the east coast) and 20% oil gas. With the opening of the Silverwater plant more and more oil gas will be used and it is predicted that by 1960 oil gas will supply a third of Sydney's needs.

Another factor influencing the transition from coal gas to oil gas is cost. New techniques coupled with the recovery of valuable by-products enable production of oil gas at prices competitive with coal gas. As more oil refineries and petrochemical plants are established in Australia, it is anticipated that increasing quantities of oil gas are likely to be used by the gas industry.

In our issue for this week we publish extracts from two papers read at the Fifth World Power Conference, recently held in Vienna, describing the gasification of the brown coal at Morwell in Victoria and the transmission of the gas to the City of Melbourne.

Another Atomic Power Station

THE Minister of Fuel and Power had given his consent to the building of an atomic power station at Berkeley, in Gloucestershire. This will be twin to the one which is to be built at Bradwell, in Essex.

According to the *Manchester Guardian*, engineers are now talking of power stations with a capacity of 300 megawatts or more. Berkeley and Bradwell will not produce much more than 200 megawatts (200,000 kw.). It is probable that the first pair of these improved stations will be similar in type to those which are to be built at the first sites, and to those which are now being built for the A.E.A. at Calder Hall and Chapel Cross.

Personal

MR. G. A. DUMMETT was elected to the Board of Directors of the A.P.V. Co., Ltd., at the annual general meeting on July 25. Mr. Dummett joined the Company in 1935 and has successively been Laboratory Manager and Scientific Manager responsible for the research and development organisation of the Company.

MR. E. T. GILL has joined the development and research department of the Mond Nickel Co., Ltd., as Development Officer for constructional alloy steels. He is taking up the position which became vacant when MR. L. W. JOHNSON was appointed Assistant Manager of the department.

MR. W. F. ADAMS has been appointed an Assistant Chief Engineer in the highways engineering organisation of the Ministry of Transport and Civil Aviation. COLONEL S. GREEN, O.B.E., has been appointed deputy to the Divisional Road Engineer, Metropolitan Division.

MR. E. S. MOSLEY has been appointed Industrial Relations Director of the East Midlands Division of the National Coal Board in succession to Mr. H. Hickson. Mr. Mosley, who is 52, was Deputy Labour Director in the Division.

MR. HENRY JAMES MITCHELL, of Taunton, has retired from the South-Western Gas Board after 50 years' service in the gas industry.

MR. P. V. THOMAS, B.E.M., Mains Engineer with the Northern Gas Board at Middlesbrough, is retiring after 47 years' service.

Diary

September 4.—EAST MIDLANDS G.C.C.: Nottingham Chamber of Commerce, Smithy Row, Nottingham. 11.30 a.m.

September 24.—WEST MIDLANDS G.C.C.: Committee Room 'C', City of Birmingham Education Department, Council House, Margaret Street, Birmingham 3. 2.30 p.m.

September 21.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Visit to the Works of W. J. Jenkins & Co. Ltd., Retford, Notts.

Calendar & Directory Alterations

The following changes have been notified during the past month. To keep the information in the current 1956 edition of the 'GAS JOURNAL' Calendar and Directory up to date readers are invited to note these alterations in the Directory Section.

Page D93.—SOUTHERN GAS BOARD: A. F. Hetherington, *Deputy Chairman* vice S. E. Whitehead, retired.

Page D115.—WILLENHALL: Delete A. G. Cranmer, *E., M. & S.;* STOURBRIDGE: A. G. Cranmer, *E. & M.*, vice J. A. Tomes.

Page D119.—SCOTTISH GAS BOARD: Dr. J. G. Davidson and A. F. Pollock, Joint Chief Financial Officers.

TONNAGE OXYGEN

BRITAIN'S first tonnage oxygen plant was opened at the Margam works of the Steel Company of Wales last week. The opening ceremony was performed by the Home Secretary and Minister for Welsh Affairs, Major Gwilym Lloyd George, at the head office in London of the British Oxygen Company, by means of a sound and closed-circuit television link.

The British Oxygen Company in this country and Gesellschaft für Lindes Eismachinen A.G. in Germany have pioneered the supply of tonnage oxygen, and an account of the formation of a joint undertaking of these two companies appears on p. 342 of this issue.

Large-scale supplies of commercially pure oxygen are needed in other processes apart from the iron and steel industry, as, for example, the production of synthetic ammonia. And, as will be seen from the account of the project for gasifying the brown coal deposits at Morwell in Australia, which appears on p. 346 of this issue, the Lurgi process depends for its success on adequate supplies of oxygen, and until this oxygen became available in quantity the process could not be a success commercially.

GAS COUNCIL'S FIFTH SALES AND SERVICE CONFERENCE

THE 5th Gas Sales and Service Conference arranged by the Gas Council will be held at Harrogate on Tuesday, Wednesday and Thursday, October 1, 2 and 3, 1957.

The programme will consist of a full opening session in the Royal Hall on Tuesday morning, October 1, followed by sectional meetings during the afternoon. There will also be sectional meetings on the morning of Wednesday, October 2, with a full session in the afternoon.

The Home Service Session will take place on the morning of Thursday, October 3, which concludes the conference. Arrangements are being made for a civic reception and for an exhibition of gas appliances adjoining the conference hall.

Conference headquarters will be at the Majestic Hotel and details of hotel accommodation and transport will be circularised to intending delegates later this year. In the meantime all enquiries should be addressed to the Conference Organiser, Mr. R. J. Gregg, The Gas Council, 1, Grosvenor Place, London, S.W.1.

Correspondence

Redundancy and the B.G.S.A.

Dear Sir,

In your editorial on 'Redundancy in the South West,' in the issue of July 25 'GAS JOURNAL,' you quote me as saying, 'As far as we are concerned, we are satisfied that the Board is doing what is right and proper.' The brevity of your quotation from a fairly long telephone conversation calls for slight elaboration or it may lead to misunderstanding.

The negotiators of this Association (together with those of other staff associations), have had frequent consultations with the South Western Gas Board, at high level, and have said that they are satisfied that the steps being taken to meet the financial difficulties of displaced staff are fair and reasonable. So, as far as this Associaton is directly concerned, that is with industrial relations, our negotiators consider that proper steps are being taken.

But we do deplore that the Board's general planning should be on such a short term basis that, having introduced throughout the area a new general consumer service system and, after widespread advertisement, having appointed a number of staff to responsible posts, another general upheaval is demanded after about two years. Such frequent wholesale changes must inevitably lead to lack of confidence among the staff and cause unnecessary hardship and inconvenience. A greater measure of stability is essential if the Board is to reap the benefit of full co-operation from its employees.

Yours faithfully,

F. C. HENFREY-SMITH,
General Secretary,
British Gas Staff Association.

London, W.2.
August 1, 1956.

Esses for Zedds

Dear Sir,

Despite the zeitgeist and the dezire to greaze and eaze the zoetrope, your exercize from zedds to esses excites averzion and must be repulzive to the gaz industry, which has taken to its heart nationalization's gift of paper work and the opportunities it affords for grammatical and statiztical exactitude.

Yours obediently,

J. R. W. ALEXANDER.

Castlefield,
Reigate.
August 2, 1956.

Present leaders in this year's R.A.M.S. Challenge Cup Golf Competition are Tottenham who, having won four of their seven matches to date, now head the table with nine points. Serious rivals for the leadership are the North Thames team who, with four matches won out of six played are in second position with eight points.

Plymouth's New Showroom Will Offer Warm Welcome

THE passer-by pausing on a winter's day to survey the latest gas appliances in Plymouth's new showrooms will not only *see* what gas has to offer—he will also *feel* it. Equipment has been fitted to throw heat on to the pavement. The floor of the showroom is also being heated.

Speaking of the new showroom and service centre at Radiant House—reopening after 15 years on August 13—Mr. A. Marshall, Plymouth District Manager, said that 'the housewife first' is the motto of the staff. The heating is part of a series of 'live' demonstrations intended to give the 90,000 consumers of the district an idea of all that is available in the way of gas cooking and heating facilities.

Neat Decorations

On the ground floor the public will see a showroom neatly decorated in silver-grey and coral shades with contemporary wallpaper. On the first floor there is to be a demonstration theatre equipped with a film projection unit, and providing seating capacity for 150 people. Ventilation in summer and heating in winter will be supplied through a 'Frenger' ceiling.

What is described as the latest thing in modern circulation methods is the boilerhouse which keeps Radiant House centrally heated. It is encased in a tower 70 ft. above the pavement, requires no attention, and operates at a regulated temperature. It is of a type ideal for commercial and hotel use.

Pearn Bros., Ltd., built Radiant House, and the architects were Whinney, Son, and Austen Hall, London.

NEW SHOWROOM AT ST. ANDREWS

THE Scottish Gas Board has opened attractive new showroom and service premises at St. Andrews. Mr. Sydney Smith, Chairman of the Board, speaking at the opening, said that the gas industry was achieving acceptance of from 80 to 85% of consumers where a free choice was allowed.

Cooking and laundering were still regarded by consumers as the logical field for gas. Only in those places where freedom was not available was electricity being given preference.

The Provost of St. Andrews, speaking at the opening, said that the Board might turn an eye on the local gasworks, when finances permitted and see whether improvements could be effected. It was to be hoped that the architect there would make as excellent a job as had been made of the gas showroom.

Mr. Charles Cooper, of W. C. Holmes & Co., Ltd., is seen on the occasion of his presentation with a tape recorder to mark his retirement from the Company. Mr. J. J. Priestley, of the research and development department, made the presentation.

RISING COSTS TAKE FURTHER TOLL IN NORTHERN IRELAND

GAS tariffs in Bangor, Co. Down, are to be increased by 8d. per 1,000 cu.ft., on August 1, making the new rates 7s. 7d. per 1,000 cu.ft. inside the borough boundary, and 7s. 11d. per 1,000 cu.ft. outside the boundary. At the same time cash discounts on payment of ordinary accounts are to be abolished and special discounts on accounts amounting to £5 and over in the quarter will be halved.

The decision was taken at a meeting of the Borough Council following a report from the gas manager, Mr. J. A. Derbyshire, showing that increased estimated operating costs for the year 1956-57 totalled £9,965—coal £4,965, wages and salaries £3,500, and loan charges £1,500.

Works to Close

Meanwhile the Cookstown, Co. Tyrone, Gas and Light Co., Ltd., is to close down after 105 years' operation, and consumers have been told that gas will no longer be available after next March.

Reason given for the closure is 'steadily increasing costs in the manufacture and sale of gas, coke, and tar.'

For stealing a gas oven Edward Jordan (28) builder's labourer, of Bradford, was sent to prison for nine months at Bradford Quarter Sessions.

Firemen Fight 30-ft. Flames at Gasworks

MAIN BLOCKED TO CONTROL GOVERNOR HOUSE BLAZE

FIREMEN and workmen fought 30-ft. flames in the governor house of Leeds Road, Huddersfield, gasworks recently. The outbreak was finally brought under control by blocking the main to 'starve' the fire, after foam and hoses had been used without success.

According to a statement by Mr. J. G. Tilley, General Manager, Huddersfield-Halifax Group, North-Eastern Gas Board, the pressure to the town mains was reduced, particularly in the area near the gasworks. The supply was not cut off altogether, however, to avert possible danger on its being restored.

During the outbreak, which was caused by a spark from an oxy-acetylene cutter igniting a small leakage of gas, police loud-speaker cars toured Huddersfield warning people to turn off their gas supplies.

MEN LEAP FOR SAFETY IN GAS EXPLOSION

THREE Bradford employees of the North Eastern Gas Board leapt for safety when a pocket of gas exploded in a pavement excavation in the Emm Lane district, recently: They were investigating reports of a gas leakage.

After a quarter of an hour the flames subsided but rumblings were heard beneath the surface of the road and smoke rose from cracks in the pavement.

Bradford firemen stood by for two hours until the Board's workmen succeeded in putting out the underground flames by sealing off a length of piping.

It is believed that an electric cable severed by a crowbar ignited the gas in the excavation.

LEEDS ATMOSPHERE REPORTED CLEANER

LEEDS was 'tons' cleaner than it used to be, the city's Medical Officer, Dr. I. G. Davies, stated recently when reporting a considerable diminution of atmospheric pollution last year.

Pollution by solids as recorded in seven different districts in the city showed in five cases lower figures than for any period in the last eight years, he said.

The reduction in tons per square mile a year in relation to 1954 were:—Headingley, 68; city centre, 65; Armley Park, 8; St. James's Hospital, 31; and Burley Park, 180. At Burley Park the figure in 1951 was 714 tons, and in 1955, 272.

B.H.D. ENGINEERS LIMITED

Record Sales Again Achieved

EFFECTS OF STEEL SHORTAGE

MR. F. B. HOLMES ON CURRENT ORDER POSITION

THE Eighth Annual General Meeting of B.H.D. Engineers Limited was held on August 1 at the Grosvenor Hotel, Buckingham Palace Road, London, S.W.1, MR. F. B. HOLMES, M.INST.GAS E. (the Chairman), presiding.

The following is his report which had been circulated to shareholders.

I am glad to be able to report that, despite the many difficulties encountered during the year, the results confirm the Board's guarded optimism expressed in my statement last year.

Sales again reached a record figure, largely due to further expansion by the Holset Engineering Co., Ltd., and the increased turnover achieved by British Furnaces, Ltd., and George Waller & Son, Ltd.

The surplus from trading as shown in the Consolidated Profit and Loss Account amounts to £633,650, a small increase of £37,310 over last year. The charges in Section I are much the same as last year. Contributions to Pension Fund show a rise reflecting the general increase in wages and salaries.

The profit before tax as carried down to Section II, £465,497, is £36,142 above last year's figure.

Taxation shows an increase of some £14,000 arising out of the somewhat higher profit and the increased rate of Profits Tax on distributions. After providing for the interest of outside Shareholders in Subsidiary Companies, the net profit after charging tax is £211,706, as against £191,518 in 1955.

Your Directors have decided to recommend a final dividend of 12½%, making 17½% for the year—the same as last year. After taking into account transfers to general reserve in subsidiary companies which, allowing for adjustment of minority interests, amount to £153,339, the balance carried forward to next year is £106,967, mostly in Subsidiary Companies.

Consolidated Balance Sheet

Turning to the Consolidated Balance Sheet, the total Members' Interest is now £1,532,042. The increase here, £168,663, represents the profit retained in the business. This increase has been partly absorbed in Fixed Assets increase £34,530 and Debtors increase £56,568, but it has also resulted in some small improvement in the Bank position. Capital Commitments are also down from £124,102 last year to £69,095. Notwithstanding these improvements the Bank overdrafts are still at a high level, especially when one considers the present rate of interest and the Government's financial objectives.

We, like others in the industry, are still suffering from the continued shortage of steel plate, making it necessary to purchase supplies from the Continent and, whilst this enables us to meet our commitments and keep our works fully employed, we have to pay greatly enhanced prices for the material and these are not always recoverable from our customers.

Every Industry will welcome the intention of the nationalised industries to peg their present prices for at least a period, during which time one can only hope that ways and means will be found which will enable them to finally stabilise them. For it is the frequent, monotonous and disturbing rise, particularly in the price of coal and transport, which is responsible for the rising cost of production, and the consequent vicious circle of wages chasing the cost of living, making for inflation which we are suffering from at the present time.

During the year, Directors and Members of our Technical Staff have again visited the United States and most countries in Europe to foster our export business and at the same time to find, if possible, new products which might be of value to the Group. This policy is showing promising results and prospects.

In my last year's Statement I mentioned a project which at the time appeared likely to be of very real interest to the Group. After a very full investigation and the most careful consideration your Board decided, regretfully, that it would not be advisable to proceed with the matter and negotiations were therefore terminated.

Every endeavour is being made to keep each Company in the forefront of new trends in its particular interests and to this end a continual, and ever increasing amount of research and development is being carried out.

Whilst the present policy of the postponement of desirable capital expenditure continues in those industries in which we are particularly interested this must have a bearing on our order books, but every effort is being made to offset this by breaking into other markets and your Directors are satisfied that, in view of the state of the order books at the present time, the current years' trading should produce satisfactory figures, subject to difficulties over which we have no control arising which would affect the final result.

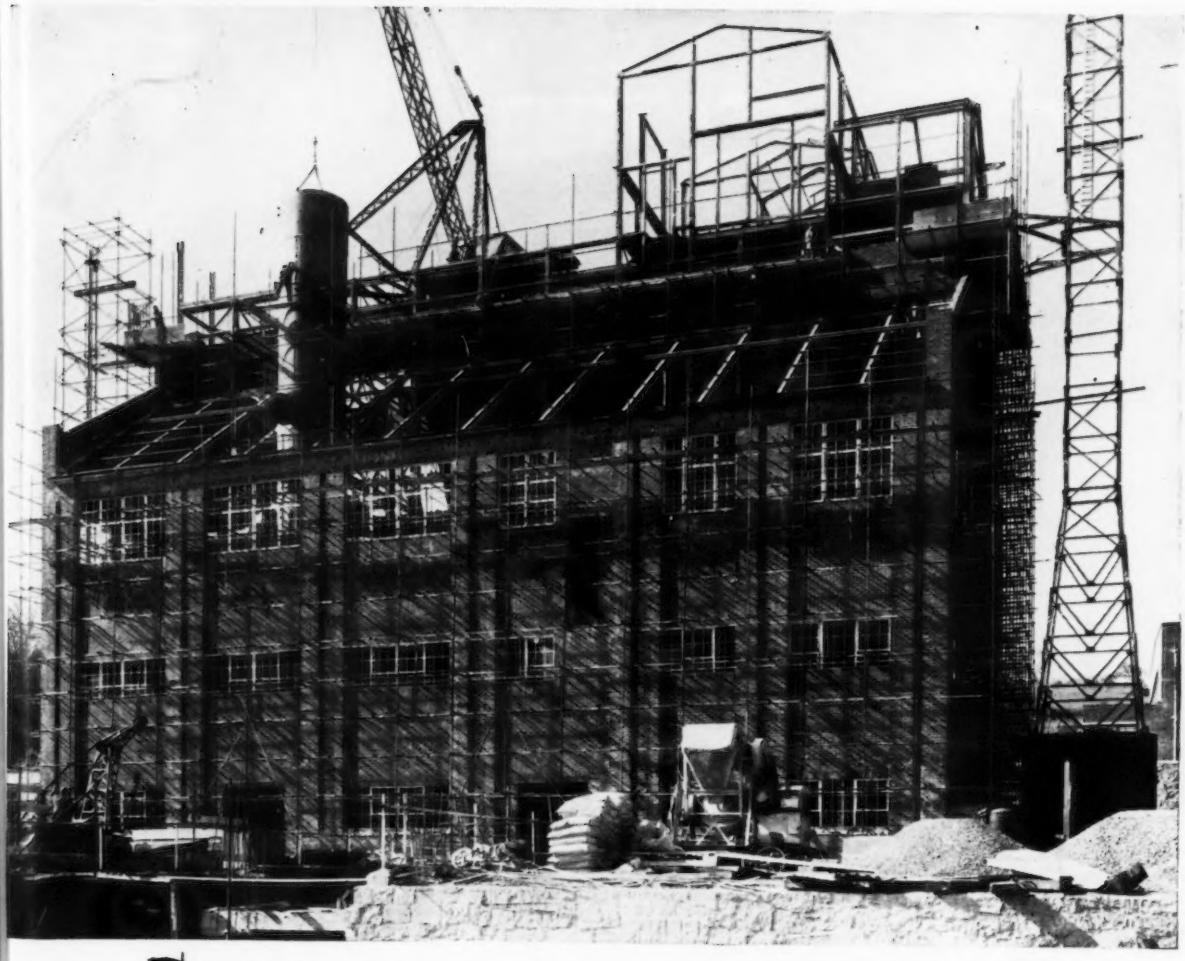
In conclusion I should like to thank, on your behalf, the Management, Staff and Workpeople of our various Companies for the contribution which they have made to the year's results. We greatly value the good relationship which subsists and team spirit shown by all concerned which is of inestimable value and assistance in dealing with the problems and difficulties which are such a feature of industry today.

The report and accounts were adopted and the dividend recommendation was approved.

The retiring directors, Mr. F. Brian Holmes, M.INST.GAS E., and Mr. Alex. Abel Smith, M.C., having been re-elected, the proceedings terminated.

IT 'EATS' 300 YARDS OF EARTH A DAY

Pictured above at St. Neots is a section of a new ten-mile welded steel gas main now being laid for the Eastern Gas Board. The trench excavator is the latest model to be produced by John Allen and Sons (Oxford), Ltd., and is known as the Allen 14/30. It is seen here digging a 2 ft. wide trench 4 ft. 6 in. deep, and has been averaging more than 300 yd. daily.



The W-D Intermittent Vertical Chamber Installation at the New Truro Works of the South Western Gas Board 18-3 3/4 ton Chambers with a Gas-making capacity of 2 1/4 million cu. ft. of 475 B.Th.U. Gas per day.

WOODALL-DUCKHAM CONSTRUCTION COMPANY LTD

Woodall-Duckham House, 63-77, Brompton Road, London, S.W.3 'Phone: KENsington 6355 (10 lines) 'Grams: Retortical (Southkens) London

A.C.E.

Mobile Debreezer that Elevates, Bags & Weighs!

'ACE' Mobile De-Breezers are designed to suit your stock yard requirements.

The Equipment illustrated is capable of bagging 20/25 tons of de-breezed coke per hour, and bulk-loading 30/50 tons.

The Unit is equipped with 60 cu.ft. Receiving Hopper, Skip Hoist, De-Breezing Screen, 'Belle Isle' Weigher, Bulk Loading Chute, Duplex Breeze Hopper, Trailer having tow bar, parking brake and pneumatic tyred wheels.

Diesel, petrol, or electric Prime Movers can be fitted. Weather protection provided to operator.

Descriptive leaflet available.

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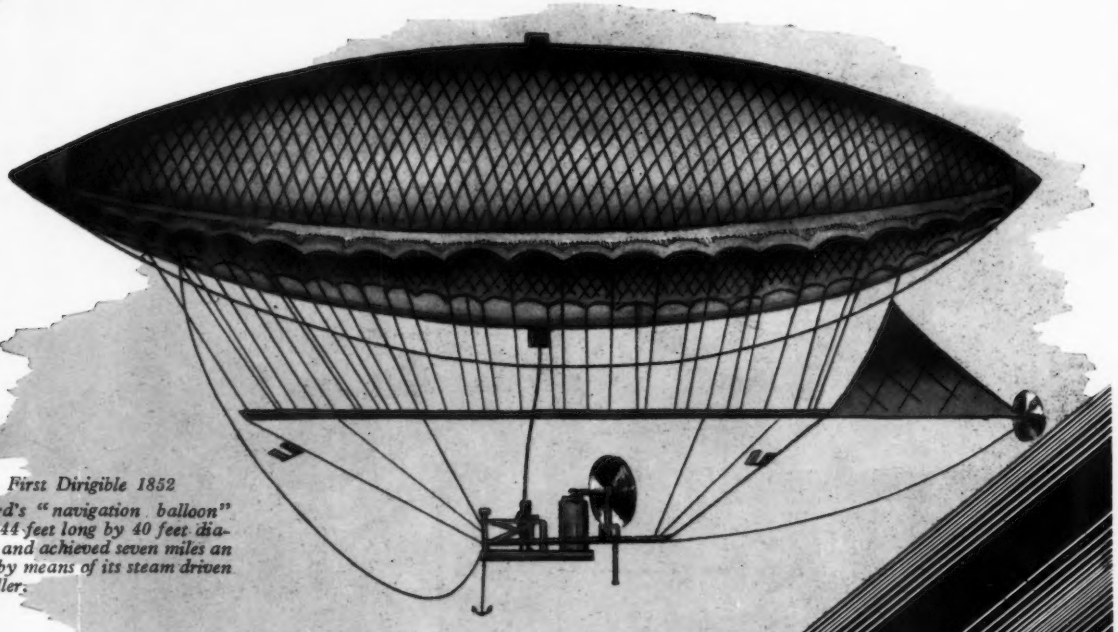
and at Brixton, London, S.W.2

From the Earliest Days .....



First Dirigible 1852
Giffard's "navigation balloon" was 144 feet long by 40 feet diameter and achieved seven miles an hour by means of its steam driven propeller.

Pioneers in the making of Cast Iron pipes for gas mains for over a hundred years—Staveley has kept in step with the ever growing Gas Industry and its mains distribution network.

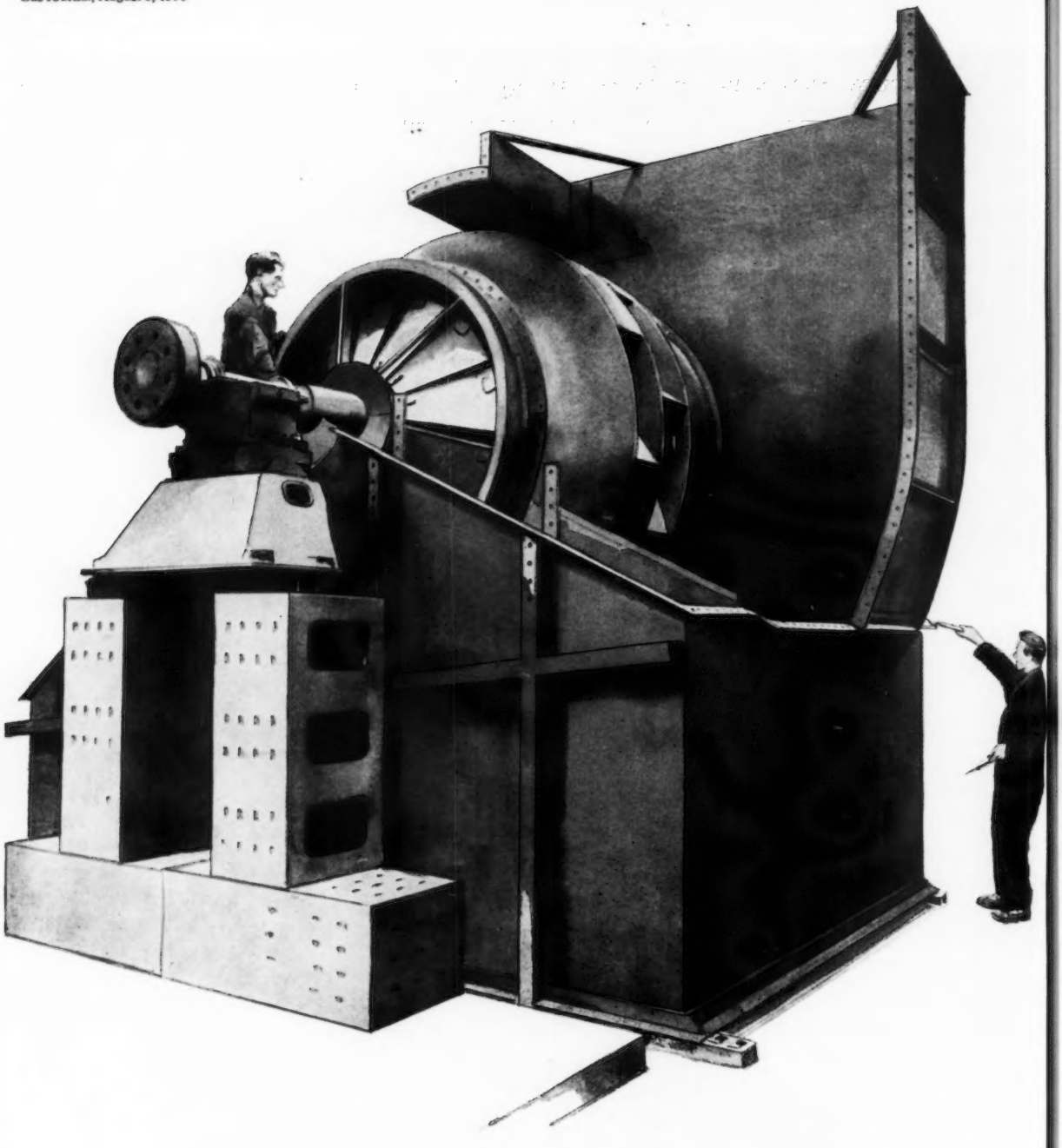
The Staveley Screw-Gland Flexible Joint is now being supplied with pipes of 3 in. to 6 in. diameters inclusive. The Bolt Type Joint is used on diameters of 7 in. and over.

The famous Staveley flexible-joints allow up to four degrees of movement and are standard with most Gas Authorities the world over.

STAVELEY

SAND & METAL SPUN PIPES
(with Run- lead or Flexible Joints)
for **GAS MAINS**

THE STAVELEY IRON & CHEMICAL CO. LTD. NR. CHESTERFIELD



Assembling a Howden induced-draught fan with vane control

HOWDEN

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Completion of the new East Anglian Grid at East Bergholt Surrey

MR. DAVID RENTON FINISHES THE 'EAST ANGLIAN JOB'

IN last week's 'JOURNAL' we reported in full the official completion of the East Anglian gas grid by Mr. David Renton, Parliamentary Secretary to the Ministry of Fuel and Power. Pictures on this page show:

Top of page: *When the section of the grid to Maldon was laid it ran beside the railway track. For many weeks a Sunday 'special' was run delivering the pipe along the track ahead of the advancing gangs.*

Above: *Sir John Stephenson, C.B.E., Chairman of the Eastern Gas Board, speaking before the ceremony, when he said: 'We have planned in due time to extend this grid still further. A similar grid is being constructed in our Cambridge Division and a third in Norfolk.'*

Right: *Surrounded by Pressmen, Gas Board officials and (behind the cameraman) workmen, Mr. Renton took his coat off in the broiling sun and tightened up those nuts to complete the last joint in the main.*

TONNAGE OXYGEN

First Plants Installed in Great Britain

Right: *An 8-ton capacity liquid oxygen transporter. An 80-ton storage tank can be seen at the right-hand side of the photograph.*

IN the following statement, Mr. F. C. S. L. Lewin-Harris, Marketing Director of the British Oxygen Co., outlines the developments in the supply of tonnage oxygen and the joining together of the largest companies producing industrial gases in the United Kingdom and Germany to develop the sale of tonnage oxygen both here, on the Continent, and overseas.

In certain industries oxygen and nitrogen, manufactured on site, are now required in very large quantities, and the British Oxygen Co. Ltd. and Gesellschaft für Lindes Eismaschinen A.G., Wiesbaden, Germany, with a view to supplying industry with the latest manufacturing and operating techniques, are announcing the formation of a joint selling company.

The company will be known as British Oxygen Linde Ltd., and will operate in the United Kingdom and overseas. It will have the advantage of co-operation with certain of the associated units of the British Oxygen Company Group.

British Oxygen Linde Ltd., with the accumulated experience of both parent companies, will be able to offer to industry air separation plants, tonnage oxygen, and nitrogen plants, of the most advanced design. Gas separation plants for separating and purifying the constituents of coke oven gas, refinery gases, and the like, are becoming more and more important, and these which were successfully pioneered by Linde are now being offered by British Oxygen Linde Ltd.

The Company is willing to carry out the complete installation of units ready to operate, including the engineering work involved. For this engineering function, British Oxygen Linde Ltd. will be supported by the British Oxygen Company's construction and contracting departments already established throughout the United Kingdom and overseas.

The directors of the new company are Mr. F. J. Clark, Mr. W. Ruckdeschel (German), Dr. P. H. Sykes, and Dr. J. Wucherer (German), two of whom are from Linde and two from the British Oxygen Company, as the two parent companies have an equal interest in the new company. The success of this enterprise will therefore depend on the goodwill and unity of purpose of both its sponsors.

British Oxygen Linde is the outcome of the British Oxygen Company's policy of service to industry by providing oxygen and other gases in the best and most economical manner to meet the prevailing demand, and by research and development of new uses for its products. As a result, many notable improvements in the methods of steel production, in welding techniques, and other processes have been made possible by the service provided by the British Oxygen Company.

Rising Demands

In recent years the demands for tonnage oxygen have greatly exceeded anything previously encountered, but the Company is prepared to meet these demands. The Company has developed its own process for tonnage oxygen production and has carefully considered all the problems which are likely to arise by its use in the steel industry. Tonnage plants are being built to supply particular localities with oxygen by pipeline, which has greatly reduced its price, though the Company is prepared to construct and instal plants for steelworks which wish to undertake production for themselves. This is in addition to all the services at present provided by the Company, which will, of course, be fully maintained.

The achievements of the Linde Company of Germany in the production of oxygen are well known, in fact, Linde are the founders of the industry for making oxygen from liquid air. It was their invention of the Linde-Frankl process which first made tonnage oxygen possible and led to the development of many new industrial processes. In particular, Linde have acquired expert knowledge and experience in the provision of oxygen for gasification and chemical processes, and they have built more than 100 Linde-Frankl plants since 1930. Linde have also perfected a process for separating coke oven gas and other gases into their constituents for use in chemical processes.

British Oxygen Linde combines the skill and experience of both the British Oxygen Company and Linde, and can offer the best possible design of tonnage oxygen or gas separation plant for any particular purpose. It can also offer expert advice and guidance in the use of the gases concerned. British Oxygen Linde's aim is to sell oxygen plants and gas separation plants, and will undertake the full erection of buildings and ancillary equipment, commissioning and testing, so that the plant may be handed over to the customer ready to work. British Oxygen Linde will not undertake the supply of gases by pipeline, or the installation of plants on a rental basis, and these matters will remain within the field of the British Oxygen Company.

British Oxygen Linde will operate in the United Kingdom and in other parts of the world where the British Oxygen Company have associated overseas companies.

Development of Tonnage Oxygen

With the steady expansion and scientific development of industrial processes the demand for oxygen has grown so large that it cannot always be best met by central manufacture and distribution in containers either in gaseous or liquid form. Today oxygen is used to such an extent in the manufacture of steel, in the production of synthetic chemicals, and in the gasification of coal and other fuels that it is frequently required by individual works in quantities of several hundred tons a day. Such a demand can only be met satisfactorily by the erection of a local plant, commonly known as a tonnage oxygen plant It is designed to supply gaseous oxygen

—and sometimes nitrogen as well—in quantity and quality to meet the demand and to deliver the gas directly by pipe line to the consuming process or processes at the appropriate pressure.

The conditions of supply of tonnage oxygen vary widely according to the process in which it is used, but there are other processes which depend on gases which must be separated by a technique similar to that of oxygen manufacture.

Oxygen is one of the most universal commodities of industry, and is used in quantities ranging from a few cu.ft. to hundreds of tons a day. (A ton of oxygen is equal to 26,000 cu.ft. of free gas.) In small quantities, it is supplied as compressed gas in cylinders which weigh ten or 12 times as much as the oxygen they contain, and in this form, costs of transport and distribution are high. The convenience which this method affords, however, greatly outweighs the complications of supply. When the demand increases to thousands of cu.ft. a day oxygen is best supplied in the liquid form. Liquid oxygen is, on an equal scale, more expensive to make than gaseous oxygen, but as it occupies little space it can be stored and transported cheaply and easily. Suitable equipment must be provided at the consumer's works to convert the liquid into compressed gas as it is required, but supply in this form is convenient and flexible, so that at the present time a large proportion of the oxygen sold by the British Oxygen Company is in liquid form. The British Oxygen Company has built for its own purposes, and now has in operation, many liquid oxygen plants with capacities ranging up to 50 tons a day and more.

Storage and Transport

The product is stored in large tanks holding up to 100 tons of liquid oxygen, sufficient to yield nearly three mill. cu.ft. of gas, and is transported by road in tank wagons carrying as much as ten tons of liquid oxygen—sufficient to fill 2,000 ordinary cylinders. On this scale of production, liquid oxygen can be supplied at highly economical rates to large industrial consumers.

With the growth of demand for oxygen in tonnage quantities the British Oxygen Company has extended its service beyond the scope of transported liquid oxygen, and has in operation a number of plants which supply gaseous oxygen in large quantities by pipeline to particular works or groups in the same locality. This system of direct delivery by pipeline offers all the economies of tonnage oxygen, and a supply network serving a group of factories enables each to obtain the advantages of tonnage oxygen on a smaller scale than otherwise would be possible.

The British Oxygen Company is, therefore, developing this system extensively and has further tonnage oxygen plants in course of erection. Plans are also being made to establish oxygen pipeline networks to serve complete industrial areas, which will depend on tonnage oxygen plants of the largest size. For fully-integrated projects, tonnage oxygen plants are offered for sale, and this service is now extended and strengthened by the formation of British Oxygen Linde.

Historical Background

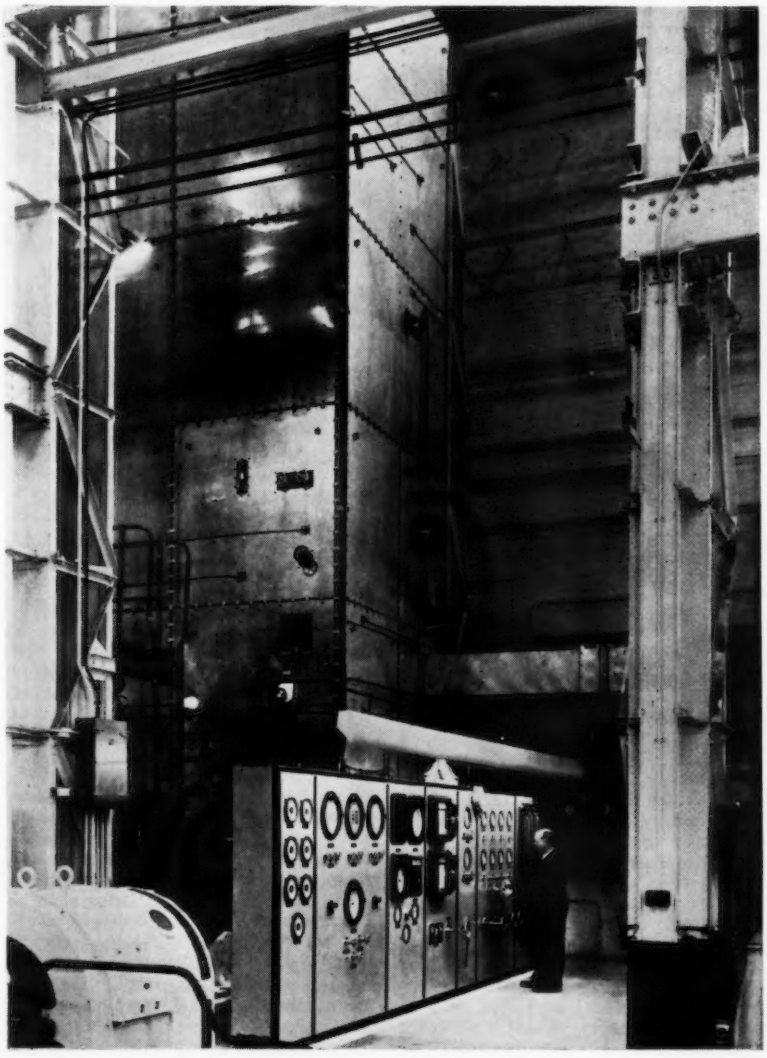
The Linde Company of Germany, as pioneers in low-temperature technology, have a background of 75 years of plant design and construction. Their founder, Carl von Linde, will be remembered as the inventor of the commercial process for making liquid air and obtaining pure oxygen from it by distillation. The Linde-Frankl process was developed by the Company in 1930, and first made tonnage oxygen available to industry. Since then the Company has built more than 100 Linde-Frankl plants throughout the world, some of which produce individually many hundreds of tons a day of oxygen, and by them have opened up entirely new fields of production in the gasification and chemical industries.

British Oxygen Linde will supply to industry oxygen plants designed and constructed by the British Oxygen Company and British Oxygen Linde, which are intended to meet the demands of industry by producing oxygen of high or medium purity at tonnage oxygen rates with the greatest flexibility in output without sacrificing economy. The plants, which are manufactured in a range of sizes sufficient to meet the largest probable requirements, include plants to provide supplies of pure nitrogen for bright annealing furnaces and other processes which require an inert atmosphere. For ammonia synthesis, too, British Oxygen Linde plants are designed to yield high purity nitrogen and oxygen of medium purity.

Technical Importance

In the following statement by Mr. A. M. Clark, General Manager of British Oxygen Linde, is summarised the background to the technical importance of tonnage oxygen to a number of industries.

Oxygen in the air is mixed with four times its volume of nitrogen which,



Right: *A rectification tower and control panel of a 50-ton per day liquid oxygen plant.*

under most circumstances, is a completely inert gas. Nitrogen is thus carried as a useless ballast through all the operations for which oxygen is necessary. In this way it slows down the process, wastes energy, and dilutes the product. Almost all the large basic industries use oxygen, in the form of air, in enormous quantities. For example, for every ton of iron made in the blast furnace about eight tons of air containing two tons of oxygen are passed through the furnace. If the bulk of the nitrogen can be removed from the air before it is used most processes will be greatly improved—provided that the cost of separating the nitrogen is not prohibitive. The process of tonnage oxygen production is intrinsically the removal of nitrogen from the air, leaving the oxygen without its cumbersome ballast. The availability of oxygen in this manner has brought advantages to many industries and has led to the development of new processes that would otherwise be impossible.

Uses of Oxygen

Almost every operation in the manufacture of iron and steel, from the blast furnace to the rolling mill, can obtain benefit from the use of oxygen. A new method of steel-making first used in Europe and now extending rapidly, is to blow the raw pig-iron with a blast of pure oxygen. In this process, by which thousands of tons of steel are now produced daily, one ton of oxygen is used in the manufacture of about 12 tons of steel, and at each steel works a large tonnage oxygen plant has been installed. Oxygen is also used in large quantities in the older methods of steel manufacture—the open-hearth and Bessemer processes—and to improve the quality of steel during its passage through the rolling mill.

Many chemical processes depend on manufactured gas. For example, in the synthesis of ammonia it is necessary first to obtain a mixture of hydrogen and nitrogen in precise proportions. This is one of the few cases in which nitrogen takes part in a chemical reaction. The most convenient way of making ammonia synthesis gas is to begin by separating air into nitrogen and oxygen by a tonnage oxygen process, and then to use the oxygen indirectly to produce hydrogen, which is blended with the nitrogen to give the correct mixture.

Town gas is normally made by the carbonisation of coal in retorts or ovens. In this process 100 tons of coal yield about 1,500,000 cu.ft. of gas, leaving a residue of about 70 tons of coke. In the U.K. the amount of coal used annually for this purpose is about 28 mill. tons. Good coking coal must be used, and the supplies of satisfactory quality are running short. By treatment with oxygen and steam under pressure coal may be converted entirely into gas of domestic quality, leaving only a residue of ash or slag. In this way 100 tons of coal, treated with about 30 tons of oxygen, will yield four to five mill. cu.ft. of gas, and the coal used need only be of very poor quality. There is no doubt that tonnage oxygen will play a big part in the rationalisation of the fuel industry, and that thousands of tons of oxygen a day will ultimately be used for gasification.

In many basic manufactures tonnage oxygen enables low-grade raw materials to be used which otherwise could not be treated economically. In this way it assists in the smelting of copper and other metals, and in the manufacture of sulphuric acid. By reaction with low-grade coal or natural gas it may be used to make petrol and a range of chemical products. It also takes part in the production of acetylene and other hydrocarbons which are the basis of many modern plastics, detergents and other chemical products.

OSAKA GAS COMPANY

Fifty Years of Progress

FIFTY years have elapsed since the initial attempt at producing gas was successful at the Iwasaki Works in Osaka, Japan. There were then only 3,300 customers who used gas for lighting purposes. The number of customers increased until it reached 40,000 towards the end of 1910 and the introduction of incandescent lightbulbs for practical use about that time gradually changed the use of gas from lighting to heating.

The outbreak of World War I had a disastrous effect on the gas utilities. In spite of an abnormal advance in prices of coal and other materials, the gas rate was not allowed to be raised. As a result, the financial condition of gas utilities so deteriorated that many of them were either put out of business or absorbed by power companies. The Osaka Company was, of course, not free from depression, but fortunately the gas sale for heating gradually improved, as inflated prices for coal and materials were brought back to normal.

Despite efforts to sell gas for heating, the increase of customers during the period between the company's inauguration and 1925 was only 85,000. In 1925, however, the administrative area of Osaka City was enlarged and the demand for gas noticeably increased, keeping pace with the development of Osaka City. And it was in 1925 that Osaka Seimi Industrial Company, which had been producing coke exclusively, was absorbed and started operation under the present name 'Seimi Works.'

The Period of Expansion

The expansion of Osaka City greatly benefited the company, the number of customers reaching 383,000 in 1935 (about 300,000 increase over 85,000 of 1925) and climbing up to 450,000 in 1940. Not only was there expansion in coke ovens both in Iwasaki and Seimi Works during this period, but Torishima Works, the company's largest works was constructed and put in operation in January, 1940, in response to the growing demand for gas and coke. During the period 1940 to 1943, with 460,000 customers and three major works in full operation, the company achieved the highest production thus far.

In 1945, the company amalgamated 14 gas companies in Kobe, Kyoto and local cities, increasing the number of customers to 880,000 altogether. By that time, however, the major cities of Japan had already been heavily air-raided. The resulting damage reduced the number of customers to 450,000 and upset both production and distribution facilities. The shortage of coal was also badly felt and this condition became so bad that only 170,000 customers out of 450,000 were served gas for a few hours a day.

Even after the war ended, the shortage of coal, materials and foodstuffs continued and the rebuilding of gas supply lagged far behind. It was after 1949, when the government control over coal and other materials was lifted, that a remarkable recovery was made. Although it entailed a long, hard struggle, the undertaking was built up until, in 1952, production surpassed the past best record of 1943.

Five Year Gas Expansion Programme

In 1952, gas consumption reached 482 mill. cubic metres but the number of customers still remained at 645,000, only 73% of the pre-war total. Accordingly, in 1953, the five-year gas expansion programme was set in motion. The programme aimed at acquiring 50,000 to 60,000 new customers yearly, and expanding both production and distribution equipment to take care of a larger demand. Required capital investment for the purpose is estimated at 16.5 billion yen in five years. So far, for the first three years, the company is ahead of the original programme. Last year the number of customers reached 800,000, and the gas consumption amounted to 24,470 mill. cu.ft. The gas consumption per meter is 2.7 times as large as that of 1937.

The popularity of gas in the city rests on its cheapness and convenience, but the difficulty is that the larger the demand the wider the seasonal differential. The normal differential between winter and summer in pre-war times was 1.2 to 1.0, whereas at present it is 2 to 1. To regulate this seasonal differential an oil gas plant and a carburetted water gas plant were installed.

New plant completed since 1952 includes: In 1952, three batteries of coke ovens at the Torishima Works, each battery of 45 ovens producing 14 mill. cu.ft. per day; in 1953, oil gas plant at the same works, each of two sets producing 14 mill. cu.ft. per day; in 1954, at the Seimi Works, a battery of 31 ovens each producing 7 mill. cu.ft. per day; in 1955, a coal-yard and coke loading facilities at a site across the canal at the Torishima Works, coal-storage capacity 120,000 tons; and in 1955, a P.G.C. carburetted water gas plant at the Iwasaki

Works, in which each of four sets produce 5.25 mill. cu.ft..

To strengthen the gas storage capacity, a waterless gas holder with a capacity of 7 mill. cu.ft., which is the largest of the kind in Japan, was built at Torishima Works in 1954.

High-pressure Pipeline Distribution

In addition to the three works in Osaka, Kyoto and Kobe have their own works. In order to secure a smooth distribution throughout these three cities, long distance high-pressure pipelines between Osaka and Kyoto, and also between Osaka and Kobe, were laid in 1950 and 1952, respectively. It was the first attempt of this kind in Japan. As a result, a system of smooth and systematic gas supply through the Osaka-Kobe-Kyoto areas is now ensured.

The five year gas expansion programme is now in its fourth year and aims at the popularisation of gas and raising the gas disseminating percentage. The programme also involves the matter of conserving wood resources. In other words, a larger demand for gas will curb the conventional use of firewood and charcoal in homes, thus enabling wood resources to be better utilised for the chemical industry.

Much has been done during a comparatively short period of time, but there are still many problems to be solved. As the population and houses in big cities have increased, the gas consumption has also increased at the ratio of more than 10% during recent years. In order to meet this rising demand for gas, the construction of additional production and distribution facilities was necessary year after year. For this expansion, the company has spent three to four billion yen every year and a similar sum will be required for the next few years.

Seasonal Differential

The second problem is the adjustment of seasonal differential of gas demand, which has become so large for the past few years that, as has been described, oil gas and carburetted water gas plants were added in 1953 and 1955. In anticipation of a still wider differential, additional water gas plants or complete gasification plants are expected to be built at Kyoto and Kobe in 1957 and 1958. In connection with coal carbonisation, there is the problem of by-products. Convenient as it is to run an oil gas plant or a carburetted water gas plant as a relief measure for the peak demand, the production of coke and tar-products must be sacrificed. The markets for coke and tar products of late have been very active, stimulated by a brisk demand by chemical industries such as synthetic fibre, plastic and chemical fertiliser. It is, therefore, equally important to adjust the production of by-products according to the market condition.

Lastly, there is the matter of complete gasification of low grade coal. In a country like Japan where the underground oil resources are negligible and natural gas is hardly expected to be produced on a large scale, the gas industry must inevitably depend on coal, the only energy resource in the country. Of the annual production of coal (40 to 50 mill. tons), however, the high grade suitable for carbonisation accounts for merely 18%. Naturally, the complete gasification of low grade coals at mines has gradually begun to attract attention, and although this type of gas production will require thorough study and investigation before it can be put on a practical and commercial footing, it is hoped that its early realisation will help in cutting cost, thereby stimulating the popularity of gas.

In Parliament

IT'S a warm wind, the west wind . . .' wrote the poet laureate. And as everybody knows, the east wind is a jolly cold wind—more particularly when there is a touch of north in it. Unfortunately, the east wind (with a touch of north in it) seems to be pouring its chill airs more and more frequently across the British Isles—so much so that it has been getting questions asked about itself in the Commons!

Oh, yes! Mr. Gresham Cooke asked the Under Secretary of State for Air the other day how often the east wind had blown during the first six months of the year; whether it was becoming the prevailing wind; and if so, whether he would tell the Minister of Fuel and Power we should need more fuel to keep warm in consequence.

* * *

As the Under Secretary was able to demonstrate that the (warm) west wind still prevailed, Mr. Aubrey Jones presumably did not have to tackle this particular problem. But he was called on to answer for £120,000 worth of gas turned to waste by the National Coal Board because the East Midlands Gas Board found it inconvenient to accept the Coal Board's offer of it—a fact which the Coal Board announced on the same day as the Gas Board announced its increased tariffs.

Mere 'teething trouble' was how the Minister shrugged this off; teething trouble that could happen when any new plant was started. And any way, during May and June only 4½% of the gas supplied by the N.C.B. was lost in this way.

Teething trouble! Only 4½%! Oh well, we love waste.

* * *

The forces of nature cropped up in the House again a few days later when the Minister was asked what he was doing about obtaining power from the sun. He was doing nothing, it appeared: his Parliamentary Secretary explained that the sun shone so seldom and so feebly on these islands that it didn't seem worth trying to coax any power from it—and is there a man, woman, or child in the country who would care to argue that one out this summer?

As is happens there is: The Minister's questioner, Mr. Ellis Smith, said darkly that while the politcians were laughing the scientists were pressing on with their experiments in gathering power from sunbeams—and getting results. We hope he's right.

The Minister was asked whether he was able to make a statement on the Government's policy concerning the recommendations of the Herbert Committee. He was not. Reminding him that the Report was produced in January and that the following month he was inviting comments from the industry, his questioner asked him when he *expected* to be able to make a statement. To which the Minister brightly answered: 'I will certainly endeavour to make a statement as soon as I can.'

Which must be *such* a comfort to those anxiously waiting to know what line the Government is going to take, mustn't it!

Fuel Efficiency—Olympia Exhibition and Conference

A CONFERENCE has been arranged to take place in conjunction with the Fuel Efficiency Exhibition at Olympia, London, from October 2-10. The Minister of Fuel and Power will open the exhibition and the conference is to be opened by Sir Graham Hayman, President of the Federation of British Industries.

Organised by a committee under the auspices of the Institute of Fuel, the conference is split into four sections. Each address will be followed by open discussions.

The first day of the conference will be October 3, when the efficient use of coal will be discussed by two speakers. On October 4 two speakers will talk about the efficient use of oil and Mr. A. E. Tyrell, North Thames Gas Board will address the conference on 'The Efficient Use of Gas.' On October 9 two addresses will deal with heat and power surveys and waste heat recovery, and on October 10, Sir Hugh Beaver gives an address 'The Clean Air Bill and Industry,' and a number of important speakers will give their views on the subject. All meetings start at 10.30 a.m.

EARNINGS IMPROVE

NET profit for 1955 of Gibbons Dudley), Ltd., and subsidiaries amounted to £181,191 against £165,285 in 1954 the annual report reveals. Total Ordinary dividend for the year amounted to 12%, absorbing, with the Preference dividend, £29,786 (against £24,770). Carry-forward was £62,299 (£59,894).

Brown

ABSTRACTS OF TWO PAPERS PRESENTED AT THE

Pressure Gasification for Town Gas Production in Victoria

By R. S. ANDREWS, D.Sc., M.I.Chem.E., F.R.A.C.I.

Chairman and Managing Director, Gas and Fuel Corporation of Victoria.

IF one were to examine the map of Australia (excluding Tasmania) on which the coal fields are depicted, one could be excused for thinking that our coal reserves were unequally distributed. Geographically this is so; economically it is not. The eastern and south-eastern portions of the continent, which contain the major coal fields, also contain over 80% of the population, and these conditions are likely to continue for some time to come.

The table shows the distribution and reserves of coal throughout the continent.

AUSTRALIA'S COAL RESERVES

State	Probable Reserves, in million tons		
	Black Coal	Brown Coal and Sub-Bituminous	Total
New South Wales	11,000	500	11,500
Victoria	12	40,000	40,012
Queensland	4,000	53	4,053
South Australia	—	600	600
Western Australia	—	1,002	1,002
Tasmania	240	2	242
Total	15,252	42,157	57,409

At the present time 77% of Australia's coal requirements come from New South Wales, and are all coking coals. The large deposits of non-coking coals in other States have not as yet been seriously exploited in relation to the overall development of the Commonwealth. At this stage in our industrial history it is imperative that these reserves of non-coking coals be developed for consumption in all possible spheres of use.

From the table it will be obvious that the large reserves of brown coal in Victoria are awaiting development to meet domestic and industrial needs of the State.

In modern times it is the tendency to generate power and produce gas on the coal fields, thus eliminating costly transport. It would appear logical then to place the plant on the coal field and obviate transportation of coal containing over 60% of moisture to a remote site.

A brown coal field should be envisaged as an area involving mining operations, power generation, briquette production, town gas manufacture, and associated industries using cheaply-won raw brown coal, power, and gas.

Initially it has to be appreciated that brown coal is a very different commodity from black; they are not readily interchangeable in the same equipment. The black coals of New South Wales had their origin in Permian forests which flourished 200 mill. years ago, whilst the brown coals of Victoria are Pliocene in age and are thus somewhere in the region of 20 mill. years old. This vast difference in age accounts for their great difference in properties.

Brown coal, however, should not be looked upon as just a low-rank coal, but rather as a cheap and easily-won form of carbonaceous material which can be upgraded by drying and briquetting so that it may compete with black coal in the various spheres of use.

If one were to summarise the properties of brown coal which distinguish it from black coal they would be as follows:

(a) Earthy nature; (b) high water content; (c) low heating value; (d) rapid deterioration in storage; (e) extreme friability; (f) high reactivity, which causes ease of spontaneous ignition; (g) rapid disintegration in a fuel bed, giving rise to serious sparking, which renders its use dangerous under Australian summer conditions in locomotives; (h) high oxygen content which results in abnormal quantities of carbon dioxide and water when carbonised; (i) does not form a coke, but gives rise to a soft, friable, highly-reactive unsaleable char.

Thus its use provides many problems which do not confront the users of black coal.

The immense task of producing town gas from the brown coal in the Latrobe Valley has been given to the Gas and Fuel Corporation of Victoria, which will employ the Lurgi High Pressure Gasification Process developed in Germany. This process involves the introduction of entirely new techniques and differs from the other large projects which have been undertaken in this country, such as large power plants, vast hydro-electric and irrigation schemes, water supply, modern oil refineries and the establishment of a great steel industry, in that it is an entirely new conception.

When brown coal or briquettes undergo conventional carbonisation treatment, the gas yield is small, and its heating value is low, as it contains 30% of carbon dioxide. The coal does not form a coke but a highly reactive char, like charcoal, which readily spontaneously ignites rendering it difficult to handle and impossible to market, so that the present process is entirely uneconomical when using brown coal.

Gasification

In a modern gasworks carbonisation of coal is usually accompanied by water gas production to meet peak loads and fluctuating demands, but, as the result of research in Melbourne it was found that when brown coal briquettes were used in a water gas plant they fragmented and broke up under the velocity of the air blast making it impossible for the plant to function economically.

The principles involved, however, formed the basis from which the ultimate plant was evolved for brown coal gasification. Research in Germany was proceeding on similar lines and after arriving at the same conclusions as we did in Melbourne, that brown coal or brown coal briquettes could not be used in a standard water-gas unit, the Germans evolved two basic principles for methods of gasification:

To eliminate nitrogen from the blast and to use steam and oxygen as the gasifying media.

To gasify brown coal or briquettes by means of a steam-laden carrier gas, preheated to 1,300°C.

Several types of processes were developed, based upon these two fundamental principles and the use of oxygen as a gasifying medium gained in popularity. It proved more trouble-free and less costly than maintaining refractory-lined regenerators at high temperatures to introduce a carrier gas into the generator at temperatures not less than 1,300°C.

The plants for the production of low calorific brown coal gas in Germany were associated with the other activities on the coal fields such as mining, briquetting, and power generation and their low cost of operation was due to the fact that they were specifically de-

(*Continued on p. 348*)

Coal

RECENT WORLD POWER CONFERENCE IN VIENNA

Construction of High-Pressure Gas Pipeline in Victoria

By G. E. BARROW, B.C.E., A.M.I.E. (Australia)

Supply Manager, Gas and Fuel Corporation of Victoria.

GAS from the plant at Morwell will be piped through an 18-in. diameter pipeline to the Metropolitan Works of the Corporation at West Melbourne—a distance of 103 miles. The first 80 miles of the line, operating at a pressure up to 400 lb. per sq. in., will terminate a Control Station at Dandenong, where the pressure will be reduced to 100 lb. per sq. in. for the remaining 23 miles to the West Melbourne Works.

The pipes are 18 in. o.d. and $\frac{5}{16}$ in. thickness of steel in 30-ft. lengths, longitudinally welded by an automatic continuous submerged arc welding machine. An internal run of weld is followed by an interpenetrating pass from the outside. The metal ahead of the arc is preheated by oxyacetylene torches carried on the welding head.

Pipes have bevelled ends for butt-welding, and are required to be within $\frac{1}{32}$ in. of a true 18-in. dia. circle; this close tolerance being necessary to permit the satisfactory use of the American type of Stringer Bead welding in the field.

The design and construction of the pipeline follow recent American practice.

The maximum working stress of the pipe is 11,500 lb. per sq. in., and, although this stress is low in comparison with American practice, structural mild steel to Australian Standard No. A. 33—1937 was not considered sufficient, and certain modifications were made in the interest of weldability and uniform quality; the main variations in the standard specification being:—

Carbon 0.25% (maximum), sulphur 0.045% (maximum), phosphorus 0.045% (maximum), tensile strength 61,000 lb. per sq. in., maximum elongation on 2 in. test specimen—25%.

Plates for the pipe are manufactured by The Broken Hill Proprietary Company Limited at Newcastle and Port Kemble, and weldability of the steel has been particularly good.

Additional chemical and physical tests over and above the requirements of A. S. No. A. 33 are carried out by the steel manufacturer under Lloyd's supervision.

At the point of manufacture, pipes are coated with an external protective coating of plasticised coal tar enamel, which has excellent di-electric properties. Tests carried out, both overseas and in Australia, have shown such enamels to be most resistant to water absorption, and to possess great durability. The coating of each pipe length in the factory is a two-stage process, viz.—a first layer of enamel $\frac{3}{32}$ in. thick, which is fibre-glass impregnated, followed by a second layer of enamel $\frac{3}{32}$ in. thick, followed immediately by a tar impregnated asbestos wrap.

The total enamel thickness approximates $\frac{1}{8}$ in. and fibreglass is used to provide additional mechanical strength. This reduces the risk of the enamel cracking during bending or other field operations, and it is also expected that the fibreglass will add to the di-electric properties of the enamel.

The outer asbestos wrap is to protect the coating from minor damage during transport and laying, and from soil stresses which may occur in heavy clay soils after the pipe has been covered. The asbestos wrap impregnated with horizontal tar maintains its strength in contact with wet soil over long periods, and does not shrink or rot.

The object of the protective system is, first, to provide an efficient protective coating of coal tar enamel, and, secondly, to provide for any defects in this coating by cathodic protection.

The cathodic protection of the line is obtained by the installation of three rectifier units placed at points of low soil resistivity, in the order of 500 ohm per cm. or less. The D.C. output of each unit will initially be about 70 watts. The maximum pipe to earth potential charge permitted at each rectifier unit will be one volt, and the minimum potential at any point on the line will be 0.3 volts. Test points are being installed at mile intervals to enable comprehensive pipe to earth potential surveys to be made periodically as a check on the protective system.

Location of Pipeline

The high-pressure section of the pipeline between Morwell and Dandenong is being laid in an easement especially acquired for this purpose, and the low-pressure section from Dandenong to the Metropolitan Works is being laid in highways and roads. The easement acquired is 66 ft. in width. Landowners are being compensated for the value of the easement, and, in addition, compensation is paid to farmers for incidental damage and loss of production during the construction of the line, or until such time as the property is restored to its original state.

Pipes are carted from the factory to the site on semi-trailer trucks fitted with rubber-lined cradles to prevent damage to pipe coating in transit. The pipes are strung along the easement ahead of construction; care being taken to support pipes on timbers placed in position to receive the uncoated ends of the pipe, to avoid damage to the coating. The trench to carry the pipeline, 29 in. in width, and nominally 4 ft. 6 in. in depth, is excavated by an Allen Parsons continuous bucket ditcher, or a Jaques-Lorain back actor, depending on the nature of the terrain. At major road crossings, railways, creeks, etc., an under-road borer is used, which was specially imported from U.S.A. to handle this work. This machine bores a hole under the road or railway, and, at the same time, puts in a 24-in. dia. casing, through which the pipe is threaded.

Welding Methods

The pipes are butt-welded together above ground to lengths of 150 yards, and, after the field joints have been tested, coated, and wrapped with coal tar enamel and asbestos felt, and the entire length checked with a spark tester, the 150 yards are lifted by three caterpillar D 7 tractor side boom cranes (3-ton capacity) into the trench, where a tie-in weld is made, using an external line up clamp. The American 'Stringer Bead' method of pipe welding is used, whereby with a special American expanding internal line-up clamp, the pipes are set to a $\frac{1}{8}$ in. gap, and the 'stringer bead' or first run is made by two welders working simultaneously on each side of the pipe. Each welder on the job is given an intensive instruction course, irrespective of his previous experience, and periodical checks are made of the efficiency of each welder.

Details of the first run, are 'stringer bead' down run with $\frac{1}{8}$ in. gap, high cellulose eight gauge rods and 200 amps at 80 volts (open circuit) obtained from a 200 amps S.A.E. (nominal 300 amps) D.C. machine mounted on a 4 ft. by 4 ft. truck.

The second run, again carried out by a two-men team, is with a ten-gauge rod making an up run at 130 amps at 70 volts (open circuit).

For the third run—a down run—an eight-gauge rod is used at 150 amps at 70 volts (open circuit). The high cellu-

lose type electrodes are used, as they are best suited to the D.C. arc used.

A mobile gamma-ray radiography unit is used to examine 10% of the field welds as a quality control measure. The unit is mounted on a four by four truck and a small shielded trailer containing the iridium 192 gamma-ray source, and is equipped as a mobile dark-room with refrigeration and heating.

All circumferential welded joints are at right angles to the pipe axis and no mitred joints are permitted. Where short lengths of pipes are required for tying in sections of the line, an oxy-bevelling cutter of American manufacture is used. This unit cuts a pipe with a suitable bevel at right angles to the axis of the pipe, and the finish is almost equal to a machined surface.

All field circumferential welds are leak tested by vacuum, and is done by means of a perspex covered steel box curved to fit the pipe, and evacuated by means of a petrol motor driven vacuum pump. A strip of sponge rubber on the underside of the box makes a perfect seal, irrespective of the longitudinal weld which it crosses. Before application of the box to the pipe, soap solution is painted over the weld in the normal fashion. Once the box has been pushed against the pipe, the pump evacuates it to approximately 22 in. of mercury, equal to a pressure test of 11 lb. per sq. in.

In order to structurally test all field welds, all pipe when installed will be hydrostatically tested to approximately 550 lb. per sq. in. When bent pipes are required for change of direction these are bent before welding into the line by the use of a Crutcher-Rolf-Cummins bending machine. This machine will bend a 30-ft. length pipe, giving a change of direction of 26° without adversely distorting the section of the pipe or damaging the external protective coating.

Pressure Gasification for Town Gas Production in Victoria—

Concluded from p. 346.

signed to use a grade of fuel not suitable for other purposes.

This gas being produced in Germany was for the purpose of synthetic liquid fuel production, but during the period in the middle nineteen thirties, Professor Drawe of Charlottenburg University was working on steam-oxygen gasification with assistants, Drs. Danulat and Hubmann from the Lurgi Company in Frankfurt-am-Main. Their calculations showed that if the gas was produced by this method under a pressure of 300 lb. per sq. in. that methane was also formed in addition to carbon monoxide and hydrogen, to the extent of 20% in the resultant gas rendering it rich enough for town consumption. This process was developed by the Lurgi Company and two large plants were erected, one at Böhlen in 1940 and the other at Brüx in 1943.

In developing this process the Lurgi Company has made possible a method of gasifying all coals, both black and brown which do not form a coke. As these coals constitute the bulk of not only Australia's, but the world's untapped reserves, this process which has been selected for adoption at Morwell, Victoria, is of far reaching importance.

The Lurgi High Pressure Process

In the Lurgi process brown coal briquettes are completely gasified by means of steam and oxygen in a generator operating at 450 lb. per sq. in. and the crude gas from the generators at this pressure containing approximately 30% of carbon dioxide passes through waste heat boilers where the sensible heat in the gas converts water to low pressure steam, at the same time a thick primary tar is deposited containing no constituents boiling below 200°C. The gas then passes through secondary coolers where a light tar is deposited containing 50% light oil boiling below 200°C. It then enters the water wash towers which remove the carbon dioxide down to 2% and 98% of the hydrogen sulphide content. After benzole removal by oil washing the gas finally passes through an iron oxide tower to remove the last traces of hydrogen sulphide.

The Morwell Plant

The site of the plant has an area 380 acres and is two-thirds of a mile from the Morwell brown coal open-cast mine and briquette factories.

Raw brown coal for the boilers and briquettes for the Lurgi gas generators will be brought to the works bunkers by means of a belt conveyor.

The plant is nearing completion and will come into operation toward the end of 1956 as originally planned. The output from 1956 to 1959 will be 15 mill. cu.ft. per day while our metropolitan requirements by then will be over 40 mill. cu.ft. per day.

The initial plant when completed will consist of six Lurgi pressure generators, two brown coal fired boilers with an evaporative capacity of 55,000 lb. per hour each, and two Linde Frankl oxygen units each capable of liquefying 500,000 cu.ft. of air per hour for oxygen separation. In addition to gas, 1 mill. gal. of tar and 300,000 gal. of benzole will be recovered per annum.

By 1959 the plant will be duplicated and by 1965 quadrupled to a capacity 60 mill. cu.ft. per day. This output will ensure Victoria's independence of interstate supplies of coal for gas production.

The gas will be produced under a pressure of 450 lb. per sq. in. and, therefore, no pumping will be required; it will come to the metropolis under its own pressure through an 18 in. steel welded pipe line. At Dandenong the pressure will be reduced to 100 lb. per sq. in. and will flow to our West Melbourne and Highett works for blending with other gases. Subsequently, gas will be pumped to the principal country centres of Victoria.

Future Fuel Policy

Long range planning is being directed into two main channels: (a) Hard coke production; (b) Fischer-Tropsch synthesis.

Research into hard coke production for metallurgical purposes and slow combustion stoves is in progress in the Brown Coal Research Department in the Engineering School, Melbourne University. Technical officers of the Gas and Fuel Corporation are in close touch with this work. The briquettes being used are from extrusion and not ring-roll presses and a pilot plant in the nature of a modified Spülgas unit will be erected in the near future by the Gas and Fuel Corporation. Its design and operation will be based upon the work being carried out at the University.

Advantage also will be taken of recent developments in Germany, U.S.A. and South Africa in the Fischer-Tropsch synthesis, as it is intended to combine town's gas manufacture with synthetic liquid fuel production.

In using this combined procedure the aim is two-fold; to produce a gas of high calorific value and to maintain plant at full production. For the former the CO and H_2 are converted to liquid fuel and the other main constituent of the gas CH_4 which is a rich gas remains unaffected. Approximately one-third of the heat units in the gas are converted to liquid fuel, two-thirds remain as a rich gas for domestic and industrial consumption. The transportation of a rich gas through the networks will reduce distribution costs and permit of a price reduction.

Liquid Fuel

There is the disadvantage, of course, that liquid fuel production is confined to town gas consumption. On the other hand, gas production is 70% of the cost of liquid fuel products and in this combination of manufacture the expensive gas making plant is already provided for. This factor renders the process economically attractive under conditions prevailing in Australia.

The second consideration involves the fact that during most of the year, other than the three winter months, most gas undertakings have a proportion of their plant lying idle and during this period gas making units could be swung over to oil and petrol production, thus using idle plant and capital and further reducing the price of gas to the consumer. We hope to have the first synthesis unit operating in 1960 and then gradually expand production over the years until 1976, 20 years after operations commence, and in that year we have planned to produce in the region of 60 mill. gal. of liquid products per annum, 27 mill. gal. of which will be petrol.

Australia has become more and more dependent upon imported oil for industry, mechanised agriculture and transport and if these supplies were seriously interrupted it is doubtful if Australia could feed her population.

Abstract of Paper Presented to the Fifth World Power Conference at Vienna

Coal Carbonisation in Continuous Vertical Retorts in Great Britain

By Dr. J. BURNS, G.M., Ph.D., B.Sc., F.Inst.F., M.Inst.Gas E.

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IT is interesting when considering carbonising practice generally throughout the world to note how the continuous vertical retort has remained so peculiarly British. This does not mean that there are no examples of this type of plant in other countries but in no other is the proportion so high as it is in Great Britain. This may very well arise from the fact that the continuous vertical plant was primarily a British development but, nevertheless, the test of time has shown that this type of plant successfully meets some of the unique requirements of the carbonising industry in our country.

The British gas industry was very well established at the beginning of this century when the first attempts were made to develop the continuous vertical retort. The industry was based entirely on static carbonising plant, either in the form of horizontal or inclined retorts or chambers, and the idea of the continuous vertical retort which came to Messrs. Woodall and Duckham in 1903 must have been attractive. The very simple idea of making the force of gravity assist in carbonisation was novel, but the possibilities of much cleaner operation with enclosed coal charging and coke discharging were probably inviting.

Pioneer work in the continuous vertical retort was accompanied by very great difficulties. The first plant, erected at Bournemouth in 1903, worked for three weeks only and never really carbonised any coal at all. The inventors used the simple method of sealing the bottom of the retort with water, and the large quantities of steam generated in the sump ascended unchanged through the retort reducing the temperature of the charge to such an extent that carbonisation ceased.

The second plant was put up in 1904 with a retort about 20 ft. long, oval in section, and tapered from top to bottom to allow for the expansion of the coke. There was no regeneration in this setting, and the first attempts to raise heats failed until the inventors introduced the practice of heating the secondary air externally by passing it through a cast-iron tube heated by a gas burner. Despite all the difficulties associated with this plant it did show that continuous carbonisation was attainable, and the operation of this unit in 1904 provided the design data for a full-scale plant which went to work in 1905. This third plant had four retorts each 20 ft. long, oval in section 24 in. by 10 in. at the top and 27 in. by 20 in. at the bottom. Heating was by gas in three combustion chambers which were directed around the retorts in a descending direction. The retorts were water-sealed at the bottom and the coke from all four retorts discharged into a common hopper whence it was removed by a plate type conveyor operating at an average speed of 18 ft. per hour. This plant operated with a reasonable degree of success during 1905 and 1906, and the principal lesson learned from this operation was the necessity to control coke extraction and coal travel individually on each retort.

Rectangular Retorts

From 1906 the progress of the continuous vertical retort was rapid. The original designers gave up the oval shape in favour of a rectangular retort and in this they were followed by Drake of Manchester. Other designers, particularly Glover and West, who had gained their initial experience on the continuous heat treatment of shale initiated new designs for oval shaped retorts and these two systems of retort construction have continued up to the present time.

Two of the principal changes in the development of the rectangular retort have been:

(a) The change in the cross-sectional area of the retort with particular reference to both the change in actual cross-sectional area and the variation in cross-sectional area from the top of the retort to the bottom;

(b) the method of heating the retorts.

Although the earlier retorts were standardised for a time at 44 in. major axis there was always an endeavour to increase the throughput of coal per unit of ground space and per unit of capital employed, and successful installations were built with major axis of 53 in., 62 in., 76 in., 82 in., and, finally, 103 in. While the throughput per 44 in. retort for a medium swelling graded coal producing gas of 500 B.Th.U. is in the region of 5 tons per day, the corresponding throughput on the 82 in. retort is in the region of 8.5 tons per day and on the 103 in. retort as high as 10.4 tons per day. Size of major axis by itself produced no difficulty in carbonising until the 103 in. retort was reached, but with the 103 in. retort difficulties in coal travel were encountered when using 'run-of-mine' or badly graded coal with heavy swelling characteristics. Quite apart from this question of size of major axis it became apparent in the development of the rectangular retort that the variation in cross-sectional area from top to bottom, or in other words the taper on the retort to allow for the swelling of the coal, was a very important factor in ease of coal travel and, consequently, in the quality of results obtained.

Heating Retorts

Considerable changes have occurred in the methods of heating continuous vertical retorts since their inception. In the early days all commercial sized retort installations incorporated downward heating. Producer gas was conveyed to the top of the setting and burned in a descending series of combustion chambers with recirculators at the bottom. In the middle 'thirties the downward heating system was generally discarded in favour of upward heating where the heating process was exactly reversed, and in the late 'thirties there was introduced a further improvement, lambent heating in which a portion of the secondary air is introduced at points above the level of the producer gas inlet. If the fuel consumption for upward and downward heating be taken as the same—at 100—the comparative figure for lambent heating with associated secondary air preheating is 81. For normal coal and coke quality the fuel used in producers in the most modern lambent heated rectangular retort systems is less than 10% by weight of the coal carbonised.

Thus, the state of development of the rectangular retort carbonising system in the early post-war years pointed to the use of retorts of 82 in. cross-section with continuous minor axis taper and a throughput of approximately 8.4 tons of medium swelling graded coal per day; it was on the basis of this general design that the North Thames Gas Board accepted the latest continuous vertical retort installation for construction at their Kensal Green Works.

Retorts of Oval Cross Section

The first plant constructed on the Glover-West system was put into operation at St. Helen's gasworks in October, 1908, and there developed the system of continuous vertical retort carbonisation based on the use of oval retorts as distinct from the rectangular retorts of the Woodall-Duckham system. There have been on the whole fewer variations in the design of the oval retort and the number of sizes have been reduced to three with 30 in., 40 in. and 50 in. cross-section on the major axis.

The coke extractor employed on oval retorts is of the worm type with the centre point of the worm impinging on the centre of the coke monolith. With this type of extractor there is a tendency for the coke monolith to be broken up by the

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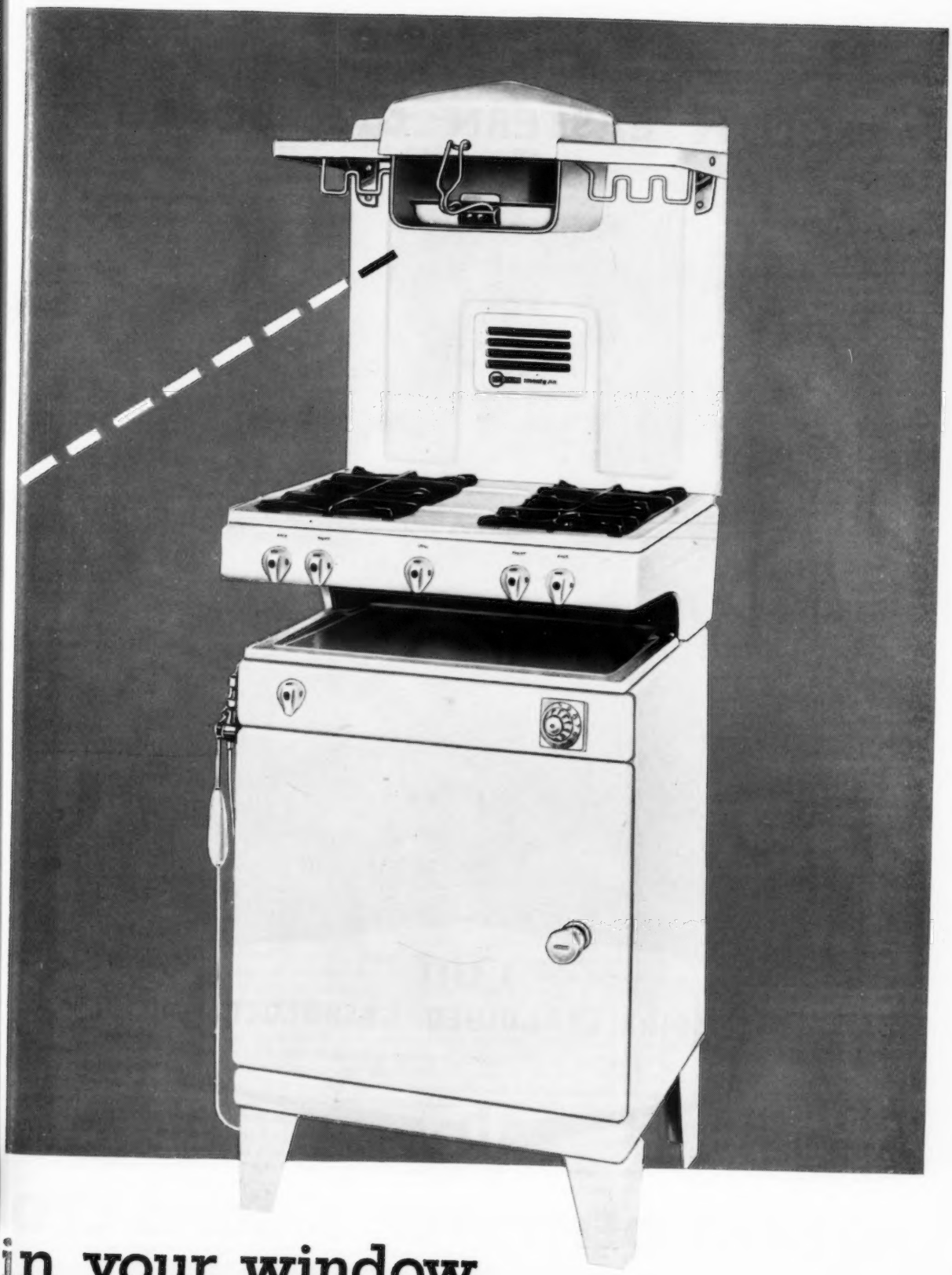

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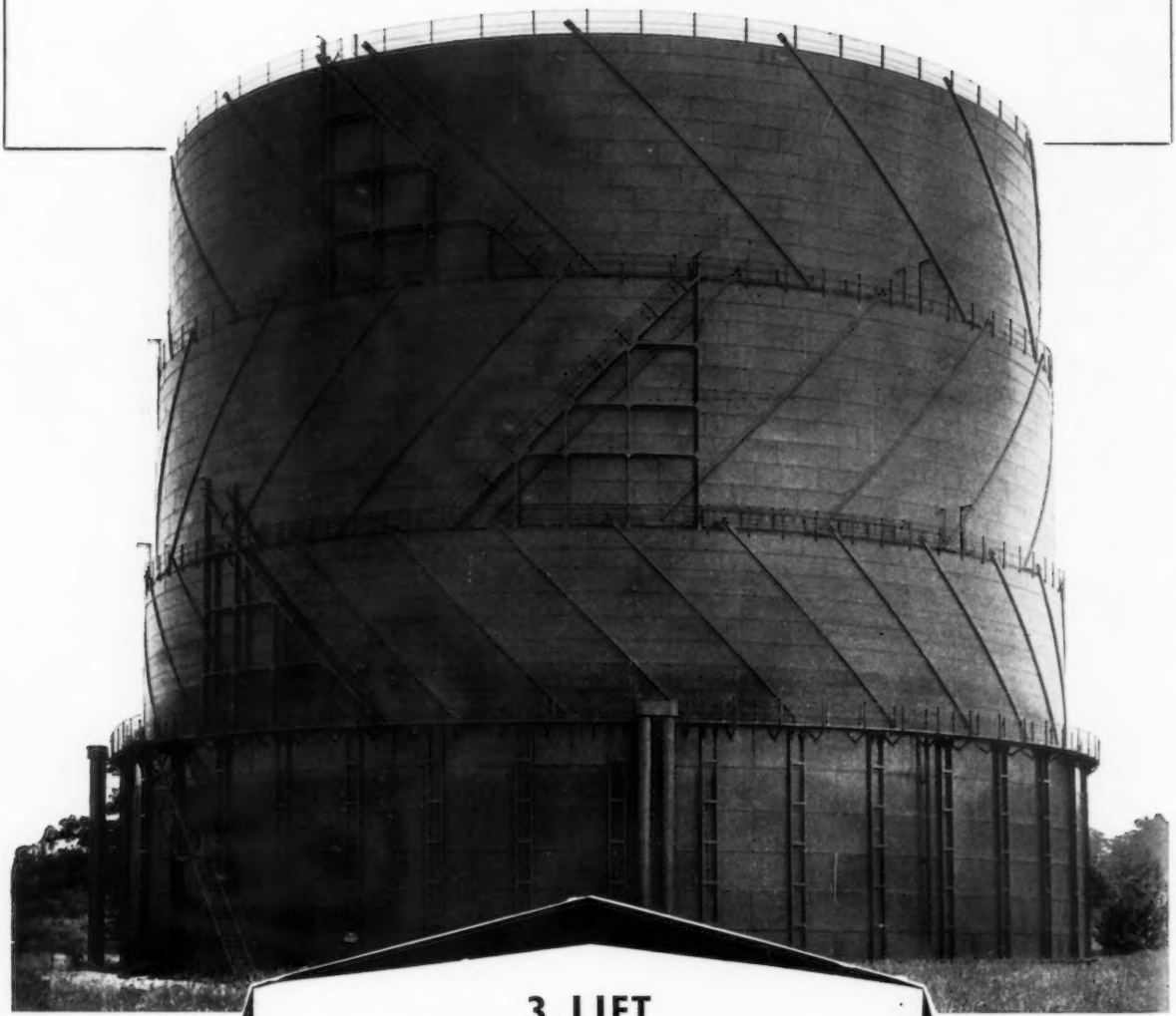

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point of the worm and in practice, it is found that retorts incorporating this type of extractor show a greater reactivity to steaming than those incorporating the scroll type.

Experience in the North Thames Gas Board indicated that an oval retort with 40 in. major axis was likely to give the best results in installations of this type, and experience gained over 30-40 years in the Gas Light and Coke Company and the North Thames Gas Board was incorporated in the latest example of oval retort plant in No. 5 Retort House at the Bromley works of the North Thames Gas Board.

Outstanding Features of a C.V.R. Installation

It is of interest now to discuss reasons why the continuous vertical retort has proved popular in carbonising practice in Great Britain.

The totally enclosed coal charging, which is possible with the continuous vertical retort, provides an amenity factor generally absent from static carbonising plant. The coal is enclosed in a coal box and, on charging, falls on to a cold surface with the minimum production of dust and smoke. Similarly, coke is discharged from the retort proper into a coke chamber where it is cooled to black heat prior to release on to conveyors. The mobile coke collecting car can be suitably fitted with dust extraction connections to a dust extraction plant, and in modern, well-designed continuous vertical plants, like those described in this paper, the dust produced from coke discharge is negligible.

Modern settings are well insulated; this not only gives efficient use of heating fuel but also gives cool working conditions on the plant. These working conditions can be further improved by the provision of cold air douches at working level and by fume extraction plants to remove the fume generally associated with retorts which are going out of action for scurfing. Well-designed spacing of the individual units of the plant gives ample room for carrying out repairs and although this feature need not necessarily be confined to continuous vertical plant it is becoming a feature of plants of up-to-date design. The general shape of the setting allows of pleasing architectural treatment of the retort house to contain the setting, but if there is any aversion to the expense of enclosing the settings in a building the vertical retort installation will operate successfully in the open-air with the provision only of an umbrella roof for operators.

In many cases ground space is an important feature in determining the choice of carbonising plant. In the experience of the North Thames Gas Board on its various works the output per unit of space of the continuous vertical retort installation is exceeded only by the intermittent vertical retort installation, and the following table shows the comparative areas occupied per million cu.ft. of gas per day by various types of plant:

(i) Intermittent vertical retort installation	4,000 sq.ft.
(ii) Continuous vertical retort installation	4,800 sq.ft.
(iii) Horizontal retort installation	6,200 sq.ft.
(iv) Coke ovens	9,500 sq.ft.

These areas include the space required for the coal handling plant immediately associated with the installation but do not include purification or coke handling plant, which would generally be of the same size for all installations.

The continuous vertical retort type of plant, perhaps more than any other type, is sensitive to specific characteristics of the coal fed to it. The results on the installation at Kensal Green, given above, indicate as an example the considerable difference in throughput which may be obtained on coals of different swelling indices; in this particular case sized Yorkshire coal with a swelling index of 5 gives a throughput of approximately 15% more than that of Durham coal with a swelling index of 7. Similarly, the results from the Bromley installation show that size of coal has an important effect, for on the same installation the use of graded coal gives an increase of 7% throughput over 'run-of-mine' coal, and extended experience over the whole range of swelling indices shows that if the throughput of coal with a swelling index of 1.5 be placed at 100 the throughput of coals with swelling indices between 2—3 will be 84, between 3—6 77; and between 7—9 73. Similarly, by correlating experience on the effect of the size of coal on throughput it can be taken that if the throughput of coal in 'nut' form be taken at 100 the throughput on the same coal with 30% below ½ in. will be 95; with 50% below ½ in. will be 89; and with 70% below ½ in. will be 83.

One of the most important advantages claimed for the continuous vertical retort type of plant is the wide range of calorific value which can be produced from it and, depending upon the type of coal and the method of operation, it is possible to vary the quality of gas produced from 530 B.Th.U. per cu.ft. down to 425. This change in calorific value can be brought about by varying the steam input into the retort with corresponding variation in the amount of blue water gas produced. This blue water gas is produced at the base of the retort with the sensible heat of the coke providing some of the necessary heat. This abstraction of heat reduces the throughput which can be reached in the retort and if the coal throughput at 500 B.Th.U. gas is taken at 100 the corresponding throughput for 475 B.Th.U. is 92 and for 450 B.Th.U. 83.

Perhaps it is in the quality of coke produced that the continuous vertical retort has special attractions for the British gas industry. In the first place the coke is of open texture and its 'reactivity' is higher than coke from static carbonising plant given the same type of coal. This 'reactivity' gives the coke special qualities for use in the open fire with or without the aid of special coke grates. This property may be measured by the critical air blast test or ignition test, and the following are representative of the results on different types of coke.

	C. A. B. cu. ft./min.	Open fire performance test mins. to reach output of 5,000 B. Th. U. per hour.
Continuous verticals	0.03 — 0.065	25 — 40
Horizontals	0.05 — 0.075	35 — 75+
Intermittent vertical chambers	0.06 — 0.075	35 — 75
Coke ovens	0.05 — 0.08	45 — 100+

A further important factor in coke quality is the very much greater accuracy with which the moisture content of continuous vertical coke can be controlled with internal steam quenching compared with the external water quenching usually associated with static coke. It is possible to manufacture with regularity a product with a maximum moisture content of 8%.

Carrier Gas Operation

The idea was conceived in 1930 of injecting 'carrier' gas into the base of continuous vertical retorts with the view at that time of increasing the benzole production. This idea, however, found little practical application until the post-war years when work by the Glover-West organisation, the North Western Gas Board, and the North Thames Gas Board, among others, pointed to the possibilities of increasing throughputs of coal by injecting a 'carrier' gas in suitable amount into the base of the retort. This work is described by T. Nicklin and M. Redman in a paper presented to the Manchester and District Section of the Institution of Gas Engineers in March, 1954. This work is also described at some length in a paper by A. F. Grant and C. H. Lewis delivered to the London and Southern Section of the Institution of Gas Engineers in April, 1955.

Blue water gas is suitable as a 'carrier,' and by injecting increasing quantities at the base of the retort the throughput of coal can be increased from approximately 9 tons to 14 tons per day on an 82 in. rectangular retort—an increase of approximately 57%. The blue water gas acts as a diluent on the coal gas produced and the gas leaving the retort under these conditions of increased throughput has a calorific value of about 450 B.Th.U. per cu.ft. If it is desired to produce gas of a higher calorific value then the 'carrier' gas must include hydrocarbons. In order to produce a finished gas of 500 B.Th.U. it is necessary to recirculate coal gas as 'carrier' but, unfortunately, under these conditions there is considerable degradation of the hydrocarbons in the coal gas and the thermal yield per ton of coal is decreased by about 14%. The economics of operation under these circumstances are not good. Very high throughputs of coal tend to emphasise any difficulties in coal travel and thus any coal which at normal throughput tends to give rise to difficulties in coal travel is unsuitable for use in 'carrier' gas operation. Injection of 'carrier' gas at the base of the retort alters pressure conditions within the retort and at maximum throughput, the pressure at the base of the retort is, generally speaking, increased by ½ in. water gauge. This increase in pressure favours gas leakage from the retort and the use of 'carrier' gas requires a higher level of repair and maintenance on retorts than does

ordinary operation to keep them gas-tight. The use of 'carrier' gas is likely to be confined, therefore, to installations where, for other reasons, it is suitable and economic to produce gas of 450 B.Th.U. per cu.ft.

Weakly Coking Coal

The Britisher still retains his love of the open fire and is likely to continue with the use of solid, smokeless fuel. There is an added incentive at the present time, with the more real recognition of the inefficiency and the harmfulness of burning raw coal, for increasing the production of solid, smokeless fuel. At the same time there is a growing shortage, with increase in price, of the gas industry's traditional gas-making coals, and the industry is, therefore, turning to the non-coking coals as a source of its raw material for the production of smokeless fuel. Much work is being done on the production of briquettes from non-coking 'smalls" while other work is directed to the carbonization of sized non-coking coal for the production of reactive smokeless fuel.

Work is proceeding with interesting results at the Bow Common Station of the North Thames Gas Board on the carbonization in continuous vertical retorts of closely graded (3 in. by 1½ in.) non-coking coals. These coals are of the 800/900 rank and are generally sold for household purposes. There is practically no coalescence of the lumps of coal in their passage through the retort and the coke appears in pieces of approximately the same size as the original coal. The gas yield is, of course, much less than that obtained from normal gasmaking coal, but costs of operation are reduced by high throughput.

The Continuous Vertical Retort in the Future

The future of the continuous vertical retort in Great Britain is linked particularly with the use of solid, smokeless fuel. If the demand continues for this commodity, it is likely to prove suitable and economic to manufacture it near the bigger centres of population. The continuous vertical retort is, therefore, likely to prove suitable both from the amenity point of view and from the quality of its products.

THE MORGAN CRUCIBLE STORY

OTHER people's family or business histories tend to be a bit of a bore—especially when they start appearing in book form. But 'Battersea Works 1856-1956,' a history of the Morgan Crucible Co., Ltd., which this year celebrates its centenary, falls wholly outside this category. Copiously and attractively illustrated, it is a fascinating adventure story; a story of enterprise and achievement; and a story of considerable scientific interest. (Incidentally, the history of the crucible goes back so far that its earlier records are shrouded in the mists of time.

A little under half way through the Morgan saga—in 1900 to be precise—their plant in Battersea was converted to electric power, and the offices received the blessing of electric light. One of those who enjoyed this newly bestowed blessing recorded that with its aid it was just about possible to see what you were doing in the office on a fine day, but that on a dark or foggy day it was difficult to distinguish faces across the room—*even when the electric light was reinforced by gas jets.*

However, the mixed blessing to the office staff of the installation of electric light opened a new era for the Battersea Morgan Crucible plant where much work was done on the development of the carbon brush for dynamo and motor—the lack of which in those early days before the use of carbon for this purpose had been thought of led many a serious engineer to speculate whether electricity was not foredoomed to failure!

Having played their part in furthering the use of carbon for the electric brush, the Morgans later extended their activities to embrace its use for arc lights, radio resistors, etc., making their name as widely known in these fields as in the world of crucibles in which they started as mere importers a century ago.

Non-Metals in Plant Construction

IN a lecture given at the recent annual meeting of the Society of Chemical Industry by Mr. H. W. Cremer, C.B.E., and Mr. G. Brearley, the authors state that the classic and purely arbitrary distinction between metals and non-metals is nowadays a matter of no particular consequence so far as the fabrication of chemical plant is concerned. Recent advances in metallurgy and metallurgical techniques have been accompanied by no less significant advances in the production of improved types of non-metallic materials of construction in greater variety as regards both their inherent properties and the forms in which they could be made available and utilised, the authors claim, and continue:

'It cannot be over-emphasised that no conflict has thereby been caused to exist between these basically differing types of material—the metal and the non-metal. They are indeed complementary in the service which they nowadays bring to modern chemical industry, and advances in both directions do not have the effect by any means of necessarily rendering old or new materials in either field obsolete.'

It was interesting to reflect on the prodigious outcome of the production of the first synthetic resin, almost 50 years ago —an outcome of outstanding importance to the plant designer as well as to the general public. Side by side with the development of new or improved materials had come improvements and developments in their methods of fabrication and application which were of no less importance.

Among the important new synthetic plastics to be discovered, polythene sheet had been adapted to use as a chemically resistant lining in chemical plant, and polythene tubing, which had the merit of permitting the use of very long lengths without joints and of providing a pipe which was resistant both internally and externally to chemical attack, was finding extended application in chemical plants. It was proving an excellent material for effluent drains which could be of all welded construction of large diameter.

Unplasticised polyvinylchloride which, in addition to being resistant to corrosion was heat resistant and non-inflammable, was, in consequence, being used in increasing quantities for fans and ducts for handling corrosive vapours as well as for conveyor belting. Glass reinforced epoxide resins were also being used for the fabrication of piping and smaller vessels.

The synthetic resins industry had not been alone in its efforts to enable the chemical plant manufacturers to meet the constantly changing and more exacting demands made upon them. The glass industry with its larger and more intricate fabrications, the ceramic industry, and the carbon products industry had all made their contributions.

The making available of these many new and improved non-metallic materials of construction during the last decade had been accompanied by the accumulation of a large amount of knowledge on their basic structures and valuable experience in their application. This held out the real hope that the new industrial tools which would continue to be called for in the future would be forthcoming.

COURSES IN HIGHER TECHNOLOGY

A BULLETIN issued by the London and Home Counties Regional Advisory Council for Higher Technological Education is intended to publicise special advanced courses held in the region which do not regularly appear in college calendars or prospectuses as part of a grouped course or as subjects offered for endorsement on Higher National Certificates. The address of the Council is: Tavistock House South, Tavistock Square, London, W.C.1.

COKE OVEN MANAGERS' YEAR BOOK

THE *Year Book* of the Coke Oven Managers' Association, just published, records the death of Mr. J. E. B. Smith, the Assistant General Secretary, whose contact with the Association had lasted 20 years. Membership, says the report of the Association's Council, has continued to increase, total register being 556. The Council also report that Sir Charles Ellis and Sir Frederick Scopes have accepted an invitation to become honorary members. President of the Association is Mr. R. J. Barritt.

TRADE NEWS SUPPLEMENT

Temperature Control

The Transitrol Indicating Temperature Controller Type 990 developed by Ether, Ltd., of Birmingham, is an entirely new self-contained direct-deflection instrument for indicating and controlling temperature to close accuracy over a wide range. It can also be applied to any process where the signal can be converted into a direct current or voltage. The Transitrol (illustrated at foot of column) operates on a revolutionary new principle which utilises a transistor and, in consequence, the need for thermionic valves, magnetic amplifiers, and oscillator circuits has been eliminated. It embodies few moving parts and does not include the usual types of electronic component that fail after prolonged use.

General Description

The Transitrol incorporates a conventional galvanometer used as the measuring system, and an indicating pointer. The latter operates a simple photo-electric system which, in turn, controls the heating medium.

The galvanometer is fitted with an Alcomax II magnet, a high-resistance coil, precision-ground hardened pivots, and spring-loaded polished sapphire jewels, thus ensuring high accuracy, stability and continuous performance under severe operating conditions. Calibrations are available for use with all types of thermo-couples.

Extreme Sensitivity

When the transistor receives full illumination a relay is energised, thus giving external switching-control. The temperature-indicating pointer is fitted with a flag, capable of passing freely between light-source and transistor, and when the desired temperature is attained the light-source is cut off from the transistor, thus de-energising the control-relay and shutting off the heating medium. The unique design of the optical system ensures that only a minute movement of the pointer is required to 'make' and 'break' the control relay, thus a very fine degree of control is obtained.

Signal-lights are incorporated to indicate mains on/off and control on/off. Mains supply, control switching, and thermo-couple connections are evenly distributed in sealed terminal-housings. The Transitrol is housed in a robust welded steel case fitted with a moulded plastic front, and fully sealed against dust and moisture.—*Ether Ltd., Tyburn Road, Erdington, Birmingham.*

Hopper Vibrators

Blending Machine Co. Ltd., of Birmingham, have recently announced a completely new and revolutionary piece of equipment.

Called an immersion type vibratory head, the unit (illustrated above) should be of considerable interest to power stations, gasworks and others who are faced with the problem of coke, coal, and other mined products clogging in hoppers and storage bunkers.

When in operation, the head does away with the need for operators equiped with crow-bar, etc., to poke at the material in order to facilitate its flow through the hopper outlet, thus a great saving is made in man-hours alone.

A decided advantage is also claimed over the usual hopper vibrators, and that is where a hopper or bunker is lined with tiles to prevent the material from sticking to the sides.

Periodicity Control

The unit is normally operated in conjunction with a variable time switch, which gives a certain periodicity of operation, the cycle of which depends upon the size of bunker, materials handled, and moisture content.

As an alternative, the vibrator controller can be in the form of either a limit or a micro switch fitted to operate in conjunction with existing mechanically operated bunker discharge gear. The units are being made in a range of sizes for bunkers up to 500-ton capacity, and delivery for normal standard types is six to eight weeks.

The company invites those interested to write, giving as much relevant information as possible to enable firm proposals to be submitted.—*Blending Machine Co., Ltd., Bond Street, Hockley, Birmingham.*

Micro-Measurement

The Fielden Proximity Meter, illustrated below, is a unique and versatile instrument for mrico-measurement of a wide range of physical variables. It has been evaluated in industry both here and overseas during the past 12 months and it has been applied to such problems as concentricity measurements of ball races, measurement of magneto striction, measurements of carbon deposit and the evaluation of the eccentricity of revolving shafts with complete success. Its employment in the inspection departments of industrial organisations has shown it to be invaluable, and it has proved itself an industry as readily as it originally proved itself with the Ministry of Supply, the Admiralty, and academic institutions.

Capacitance Change

The application of the proximity meter, model P.M.2, depends upon the measurement of the capacitance change which in most applications is brought about by small mechanical displacements. By ingenuity in the arrangement of the electrode it is possible to apply this method to almost any problem.

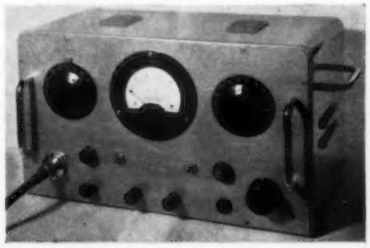
The instrument is capable of both static and dynamic measurement, and has been successfully applied (for example) as a strain gauge, a surface gauge, a vibration meter, a torque meter, a paint thickness gauge, a micro-thermometer, a pressure gauge, etc.

Minute Movements

This use of capacitance change allows a very great sensitivity in measurement, and the sensitivity of the P.M.2 is in fact far greater than the limits practically imposed by the mechanical stability of the measuring arrangements to which it is applied. For example, in the field of mechanical displacement a movement of less than .00001 in. may be detected with a suitable electrode arrangement.

Changes of the same order in product composition and contamination can be observed as dielectric changes, and the P.M.4 incorporating an external bridge unit is ideally suited for this purpose.

The standard PM. 2 instrument is supplied with 6 ft. of special co-axial cable terminated in a length of 2 B.A. screwed rod, while for the PM. 4, the length of co-axial cable from the bridge unit to the electrode is standard at 6 ft., with 6 ft. of cable from the main instrument to the bridge unit.—*Fielden Electronics Ltd., Paston Road, Wythenshawe, Manchester 22.*



like the Century cooker...

it looks even better

The popular Century Cooker is now the colourful Century... it's available in cream and blue, in cream and green, or in all cream finishes. The two colour models have the hobplate, platerack, tap knobs and oven door handle in the green or blue finish. On all models the oven tap knob is red.

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The Main No. 20
CENTURY
Cooker

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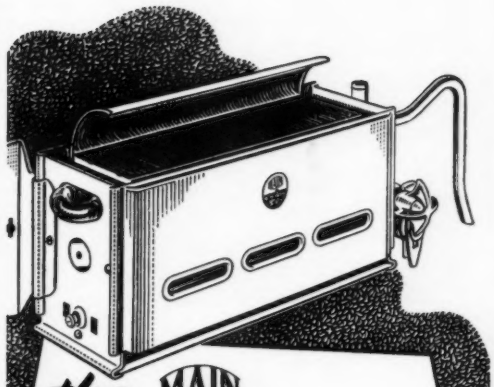
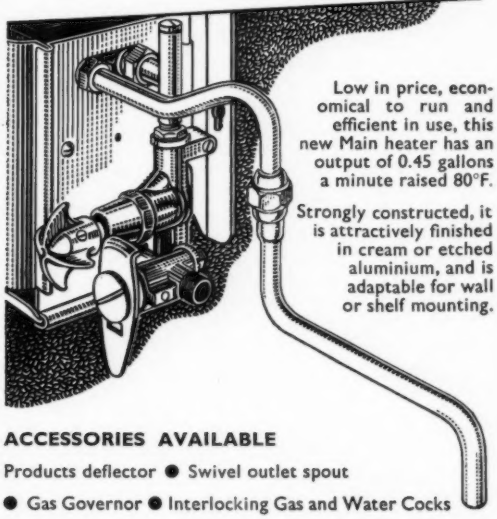
the NEW water heater for single-point duty . . .



the MAIN MINIMAIN instantaneous GAS WATER HEATER



Low in price, economical to run and efficient in use, this new Main heater has an output of 0.45 gallons a minute raised 80°F.

Strongly constructed, it is attractively finished in cream or etched aluminium, and is adaptable for wall or shelf mounting.

ACCESSORIES AVAILABLE

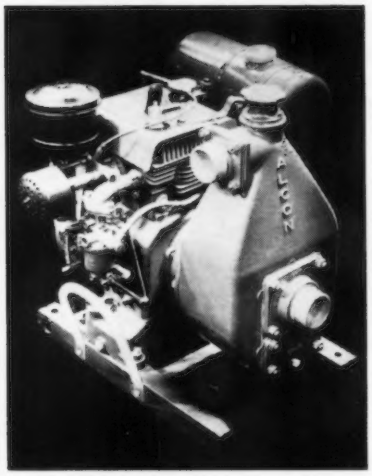
Products deflector ● Swivel outlet spout ● Gas Governor ● Interlocking Gas and Water Cocks complete with gas and water throttles and pilot light

low priced to meet popular demand

MAIN WATER HEATERS LTD.
Gothic Works, Thornton Road, Croydon, Surrey

W 34

Redesigned Pump



The 2-in. Alcon pump has been completely redesigned, the outstanding feature in the performance of the new version being an increase in the output from 7,000 gal. to 10,000 gal. per hour.

The total head has also been increased from 70 to 100 ft. Carrying handles have been added to make the pump, which weighs 98 lb., easily portable by two people. It can be supplied powered by a JAP or Villiers engine, or with a totally enclosed electric motor. It can also be supplied trolley mounted.

Variable Output

Variable output is achieved through engine speed control. Petrol, kerosene, diesel, and lubricating oils can be handled effectively with this unit. Liquid manure and other liquids containing up to 25% solids can also be handled effectively.

The main uses of the pump will be found on farms, market gardens, dairies, estate managements, nurseries, contractors, civil engineering, municipal engineering, and building. Wherever drainage, water storage, or irrigation problems arise, it will be an indispensible asset.

Specification

The unit consists of a centrifugal self-priming pump, spigot mounted directly on to the engine crankcase, with the impeller fitted to the extension to the engine crankshaft. The engine and the pump combined are mounted on a baseplate.

The priming is by water re-circulation. Efficient priming is obtained by the use of adequate re-circulation passages, ample priming water, and a large chamber for the separation of air and water.

There are no priming valves or moving parts contained in the priming system and therefore there is no possibility of the self-priming characteristic failing. After the pump has been primed the output can be varied by means of the engine speed control.

A simple non-return valve of hard wearing rubber is fitted to the inlet, ensuring quick and efficient re-priming under all circumstances even when the pump is working on 'snore.'

A drain plug is fitted to the bottom of the body of the pump, draining the whole pump including the volute. Complete protection is given against frost and cold weather.

Three-bladed Impeller

The impeller is of the three-bladed open type, manufactured from close grained cast iron.

The seal incorporated in the pump is a mechanical face type, utilising for standard conditions a centrifugally cast iron counter-face with a carbon running face and Hycar rubber sealing bellows.

The seal is arranged to be in 50% balance, giving high efficiency of sealing with minimum pressure, thus ensuring long and consistent life.

No Running-in

The faces of the cast iron counterface and carbon running face are ground optically flat during manufacture and the seal is effective immediately after assembly without any necessity for a running-in period.

A hand operated lever is fitted on the side of the engine cowl by which ready adjustment may be made to the speed of the engine, thus controlling the output from the pump.

Cast iron units can also be supplied, and the pump can be supplied with a shaft extension and pulley suitable for belt drive.—*Arthur Lyon and Co. (Engineers), Ltd., Stamford, Lincs.*

GAS SERVICE FILTER

The Margrave gas service filter is designed for the easier maintenance of power operated vacuum units used in service pipe clearance. This device, when connected between the vacuum plant and the service to be cleared, prevents all rust, scale, and other impurities from being drawn into the main tank; therefore cleaning is not required.

In many areas, it has been found that the periodic cleaning of the vacuum tank is an unpleasant, lengthy, and sometimes even dangerous task, being often left until a considerable deposit has accumulated. The greater the deposit, the less is the effective capacity of the tank and the heavier the load for the van to carry. The use of the Margrave service filter in the vacuum line enables the deposit to be collected in the catch-pot and disposed of in less than three minutes, at convenient intervals.

The filter has been under test in one of the gas boards, and has been proved to be successful on both wet and dry services. During the tests, the filter was cleared daily to enable observations to be made on the amount of deposit obtained from services. In practice, the intervals at which it is to be cleared are best left to local decision, as the time required for this operation is negligible.

The filter is very sturdily made, and is tested under vacuum and pressure. The cleaning is carried out by undoing four nuts and lifting out the inner container.

The Margrave service filter in no appreciable way alters or impedes the operation of any suction unit, but renders the maintenance of this unit an easy matter. It reduces wear on the vacuum plant and on the evacuating pump, as all particles are eliminated from the main tank, and obviates the necessity for opening and re-sealing of handholes on the main tank, which frequently occur in awkward positions.

It enables the deposit from any particular service to be examined whilst still connected, and can be left on the van, or is easily lifted off by the two carrying handles. If it is then placed at the connection to the service, it can be employed as a guide to the effectiveness of the suction, since the particles can be heard falling.—*Abbott, Birks & Co., Ltd., 90-91, Blackfriars Road, London, S.E.1.*

Giant Ventilators

These workmen had a grand view of North East London as they fitted giant Colt ventilators over the Grand Hall at Olympia, London. This ventilation scheme caters for both summer and winter ventilation. Air inlet is provided by Colt mechanical roof inflow units whilst extract ventilation is provided by Colt SRC. 3080 controllable high duty natural roof extract ventilators. The installation will be completed by the end of this month.—Colt Ventilation Ltd., Surbiton, Surrey.

Gunmax Compositions

G.R. Gunmax compositions are designed to increase furnace productivity and reduce shut-down time. These granular compositions possess a high refractoriness, good packing density and the ability to adhere when applied to a hot lining. They are offered in three grades—C (chrome), MC (mag-chrome) and M (magnesite).

Gunmax can be easily parged with a suitable paddle or shot by compressed air gun on to hot basic linings in cupolas, copper converters, electric arc furnaces, mixers, open hearth furnaces, soaking pits, smelting furnaces, etc., to form a durable repair which will enable the maximum length of service to be obtained from the lining.—*General Refractories Ltd., Generax House, Sheffield, 10.*

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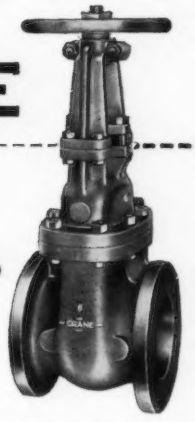

PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price **1/6d.**; by post **1/8d.**

Subscription Rates: Home and Empire:—**60/-** per annum; Foreign:—**70/-** per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at **2/6** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120**.

BUSINESS MANAGER: S. T. CULLEN

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN & MIDLANDS REPRESENTATIVE: A. Engelhardt, T.D., 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Fleet Street 2236-7.

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APPOINTMENTS VACANT

WALES GAS BOARD

SWANSEA UNDERTAKING

APPLICATIONS are invited for the appointment of DEPUTY ENGINEER AND MANAGER to the Swansea Undertaking.

The applicant must have a sound knowledge of modern distribution practice and of the management and administration of a gas undertaking.

The Swansea Undertaking is supplied with coke oven gas from the Board's Grid system, and to meet peak load demands carburetted water gas is manufactured. Ability to control these peak load plants is necessary, and appropriate technical qualifications are essential.

The commencing salary, according to experience and qualifications, will be within Grade B of the Senior Officers National Salaries Table (£1,105/£1,265 per annum). The post is pensionable.

The successful applicant will be required to pass a medical examination.

Applications, giving details of age, qualifications, experience and present position, together with the names of two referees, should reach the undersigned not later than August 31, 1956.

C. B. MAWER,
Secretary.

2, Windsor Place,
Cardiff.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION
NORTHAMPTON GROUP
VACANCY FOR WORKING GASFITTING FOREMAN—WOLVERTON/STONY STRATFORD DISTRICT

APPLICATIONS are invited from fully qualified gasfitters for the position of WORKING GASFITTING FOREMAN for the Wolverton/Stony Stratford district (Northampton Group). The appointment will be made initially within Intermediate Grade IV/V (salary range £500-£570) with Class 1 Conditions of Service.

The person appointed will assist with the improvement and consolidation of service to a reorganised district of some 7,600 consumers, and there will be scope in due course for his establishment as a supervisory foreman within the Staff grades.

The Gasfitting Foreman will reside at Stony Stratford, where a newly constructed flat will shortly be available under a standard Service Occupation Agreement. He will be required to undertake certain standby duties, on a rota basis, in connection with the grid reception/holder station, for which an appropriate payment will be made.

Applications stating age, qualifications, and experience, and giving the names of two referees should be addressed to reach Mr. E. B. Craddock, Group Manager, 45, Abington Street, Northampton, not later than Wednesday, August 22, 1956.

H. B. TAYLOR,
Divisional General Manager.

Leicester.
July 23, 1956.

(*Classified advertisements continued on page* 362)

APPOINTMENTS VACANT (ctd.)

FOREMAN and Skilled Erectors required for Gas-works Plant, i.e., Condensers, Purifiers, etc. Apply stating age and previous experience to Clapham Bros. Ltd., Wellington Works, Keighley, Yorks.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION
DISTRIBUTION TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of DISTRIBUTION TECHNICAL ASSISTANT in the No. 2 District Distribution Department, Rotherham, at a salary within Grade APT. 8 of the National Salary Scales for Gas Staffs (£710/£790) per annum. Initial placing will be dependent upon the qualifications, experience and ability of the successful candidate.

Applicants should have had considerable practical experience in mains and service work generally and have some knowledge of the design of distribution systems, together with experience in the estimation of costs. A house is available at a reasonable rental.

The post is pensionable, and the successful applicant will be required to pass a medical examination.

Applications giving full details of age, education, qualifications, experience, present position and salary, together with the names and addresses of two referees, should be addressed to reach the undersigned not later than August 27, 1956.

CHAS. C. WOOD,
Divisional General Manager.

Gas Offices,
Commercial Street,
Sheffield, 1.

July 30, 1956.

WEST MIDLANDS GAS BOARD

SHROPSHIRE DIVISION
DRIVER-SALESMAN

APPLICATIONS are invited for the above position. The successful candidate will be required to drive and be in charge of a Mobile Showroom operating within the Division and based at Iron Bridge.

The salary will be within A.P.T. Grade 5 (£575-£655 p.a.) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, education, qualifications and experience, together with the names of two referees, should be addressed to Mr. W. Oldham, Divisional General Manager, West Midlands Gas Board, Sidney House, School Court, Shrewsbury, to reach him not later than August 15, 1956.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION
ASSISTANT ENGINEER AND MANAGER, STRATFORD-UPON-AVON DISTRICT

CANDIDATES must have a sound technical train-ing and practical experience of modern gas production and distribution. Experience on the district with consumers, architects, etc., would be an advantage.

The salary will be within A.P.T. Grade 8 (£710-£790 per annum) of the National Salary Scales for Gas Staffs. The post is pensionable and the successful candidate may be required to pass a medical examination.

A house is available at a reasonable rental which the successful applicant will be required to occupy.

Applications, stating age, qualifications and experience, should be addressed to Mr. A. Allen, Divisional General Manager, West Midlands Gas Board, Warwickshire Division, Gas Street, Coventry, to reach him not later than August 20, 1956.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

SHROPSHIRE DIVISION
MAIN AND SERVICE LAYER

A COMPETENT main and service layer is required by the Wellington District. N.J.I.C. Prov. "A" rate will apply at present 4s. 0½d. per hour.

A house is available at a reasonable rental on a service tenancy agreement if required.

Applications stating age, and experience, should be addressed to the Manager, Gas Offices, Market Street, Wellington, to reach him not later than August 15, 1956.

SOUTH WESTERN GAS BOARD

BRISTOL/BATH DIVISION
SENIOR TECHNICAL ASSISTANT—AVON STREET WORKS

APPLICATIONS are invited for the above position. The successful applicant will be placed within Grade IX (£755-£855) or Grade X (£820-£920) according to experience and ability. Associate Membership of the Institution of Gas Engineers is a desirable qualification and the holding of a Higher National Certificate in Mechanical Engineering will be an advantage.

The Manufacturing Plant consists of Horizontal Retorts and Water Gas Plant.

A good flat in a very desirable residential area is available at a reasonable rent.

Applications, addressed to the undersigned, should be received not later than August 31, 1956.

CHARLES R. INGHAM,
Production Engineer and Manager.

Radiant House,
Bristol, 1.

July 27, 1956.

NORTH WESTERN GAS BOARD

SOUTH LANCASHIRE GROUP
DEPUTY STATION ENGINEER—ST. HELENS

APPLICATIONS are invited for the above pension-able appointment at a commencing salary of £1,100 per annum.

The successful applicant will be directly responsible to the Station Engineer for the operation of the works which has a weekly production capacity of 85 mill. cu.ft. of coal gas from 50 in. Glover West Retorts and 45 mill. cu.ft. water gas from Humphreys and Glasgow automatic C.W.G. plant.

Detailed applications, giving the names of two referees, should reach the General Manager, N.W.G.B., South Lancashire Group, Radiant House, Cotham Street, St. Helens, not later than August 25, 1956.

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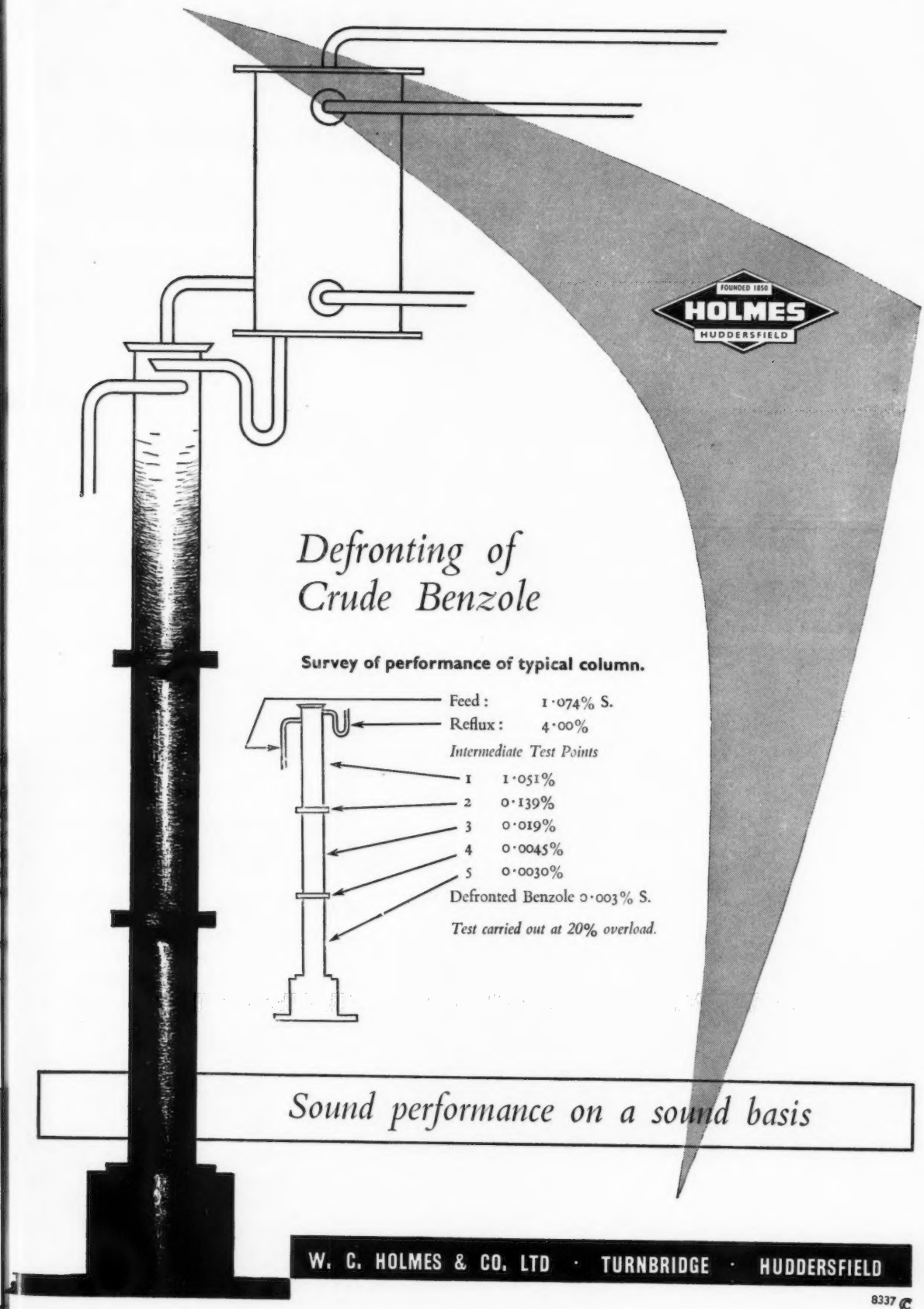

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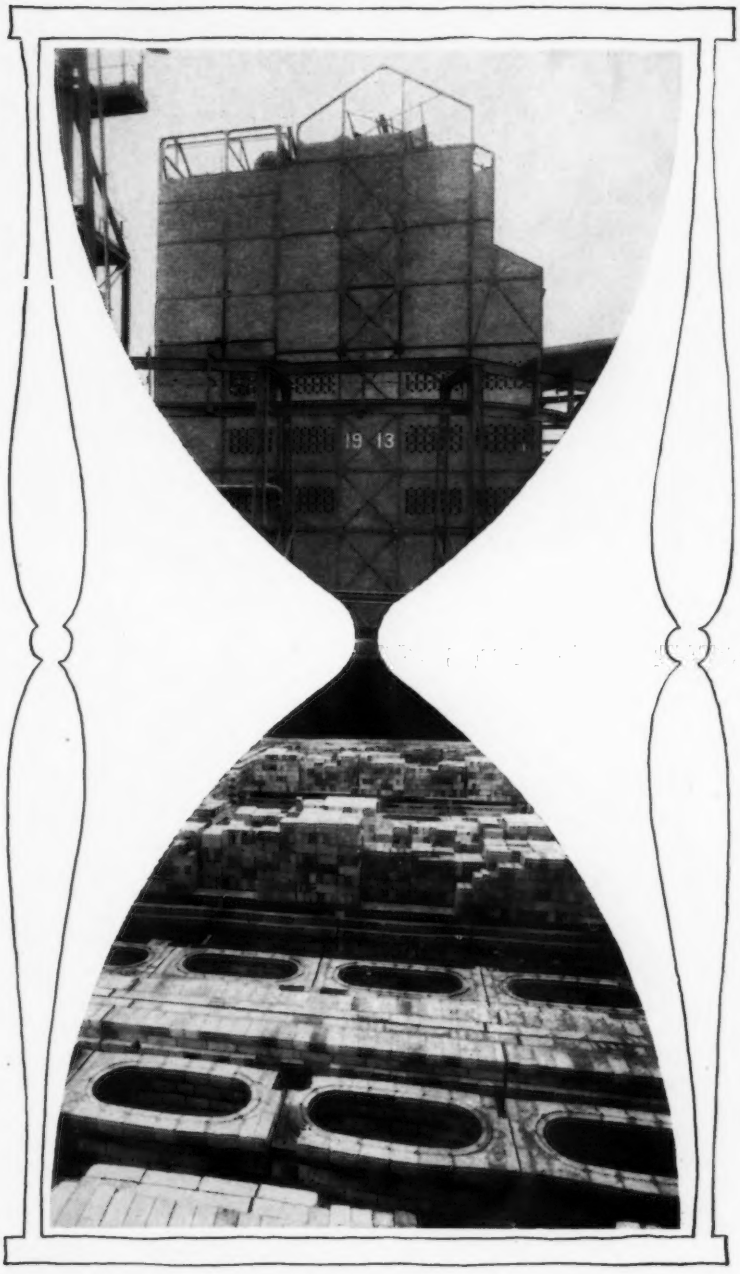
Photographs by courtesy of Northern Gas Board.



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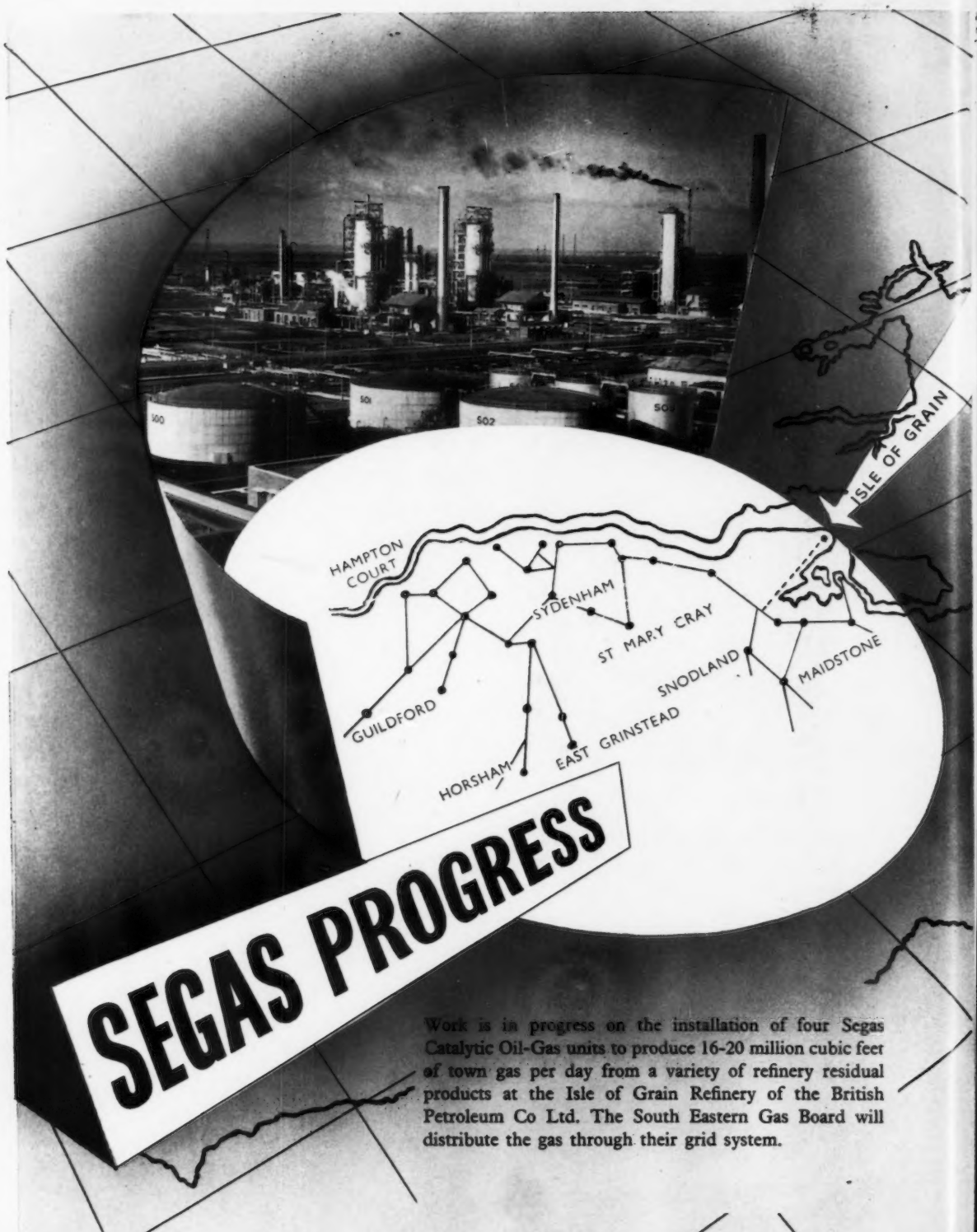

SEGAS PROGRESS

Work is in progress on the installation of four Segas Catalytic Oil-Gas units to produce 16-20 million cubic feet of town gas per day from a variety of refinery residual products at the Isle of Grain Refinery of the British Petroleum Co Ltd. The South Eastern Gas Board will distribute the gas through their grid system.

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